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☐	L55	L54 and (mining near5 pattern)	9
☐	L54	mining near5 template	47
☐	L53	6061682 .uref.	17
☐	L52	L51 and @py<=2003	11
☐	L51	(discover$3 and mining).ti.	20
☐	L50	(knowledge and mining).ti.L48	0
☐	L49	(discover$3 and mining).ti.L48	0
☐	L48	6292797 .uref.	6
☐	L47	L46 and attributes	4
☐	L46	(mining and pattern and discovery).ti,ab. and @py<=2003	17
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☐	L44	(mining and pattern and discovery).ti,ab.	21
☐	L43	(pattern near5 join$3) and (pattern near5 template) and relational and database$1 and mining and tables	3
☐	L42	(5809499 or 6434570).pn.	4
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☐	L14	l12 and join	1
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☐	L8	L7 and template$1	20
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☐	L5	(multiple near5 data) and (data near5 sets) and (data near5 mining) and (mining near5 templates) and ((discover$3 or knowledge) near5 (attribute$1 or table$1))	4
☐	L4	(multiple near5 data) and (data near5 sets) and (data near5 mining) and (mining near5 templates) and ((discover$3 or knowledge) near5 (attribute$1 or table$1)) and @py<=2003	0
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Ling, C.X.; Jianfeng Gao; Huajie Zhang; Weining Qian; Hongjiang Zhang;
System Sciences, 2001. Proceedings of the 34th Annual Hawaii International (
Jan 3-6 2001 Page(s):9 pp.

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□   2. **An evolutionary approach to pattern-based time series segmentation**
Fu-Lai Chung; Tak-Chung Fu; Ng, V.; Luk, R.W.P.;
Evolutionary Computation, IEEE Transactions on
Volume 8, Issue 5, Oct. 2004 Page(s):471 - 489
Digital Object Identifier 10.1109/TEVC.2004.832863

AbstractPlus | References | Full Text: PDF(1312 KB)   IEEE JNL
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□   3. **Evolutionary time series segmentation for stock data mining**
Fu-lai Chung; Tak-chung Fu; Luk, R.; Ng, V.;
Data Mining, 2002. ICDM 2002. Proceedings. 2002 IEEE International Confere
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□   4. **Wavelet based UXO detection**
Hodgson, S.; Dunstan, N.; Murison, R.;
Data Mining, 2002. ICDM 2002. Proceedings. 2002 IEEE International Confere
9-12 Dec. 2002 Page(s):617 - 620
Digital Object Identifier 10.1109/ICDM.2002.1184012

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□   5. **A semantic-based image retrieval system: VisEngine**
Jian-Yong Sun; Zheng-Xing Sun; Ruo-Hong Zhou; Hui-Feng Wang;
Machine Learning and Cybernetics, 2002. Proceedings. 2002 International Cor
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6. **Damage pattern mining in hurricane image databases**
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7. **Disease-specific probabilistic brain atlases**
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8. **HierarchyScan: a hierarchical similarity search algorithm for databases o
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                                              Wijsen, J.;
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                                              Ke Wang; Fung, B.C.M.; Yu, P.S.;
                                              <u>Data Mining, Fifth IEEE International Conference on</u>
                                              27-30 Nov. 2005 Page(s):466 - 473
                                              Digital Object Identifier 10.1109/ICDM.2005.142

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Taniar, D.; Rahayu, J.W.;
<u>Database Engineering and Applications Symposium, 1998. Proceedings. IDEA
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8-10 July 1998 Page(s):159 - 168
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<u>AbstractPlus</u> | Full Text: <u>PDF</u>(80 KB)   **IEEE CNF**
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☐   2. **Parallel double sort-merge algorithm for object-oriented collection join qı**
Taniar, D.; Rahayu, W.;
<u>High Performance Computing on the Information Superhighway, 1997. HPC A:</u>
28 April-2 May 1997 Page(s):122 - 127
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☐   3. **Efficient record linkage in large data sets**
Liang Jin; Chen Li; Mehrotra, S.;
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<u>AbstractPlus</u> | Full Text: <u>PDF</u>(494 KB)   **IEEE CNF**
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☐   4. **CME: a temporal relational model for efficient coalescing**
Al-Kateb, M.; Mansour, E.; El-Sharkawi, M.E.;
<u>Temporal Representation and Reasoning, 2005. TIME 2005. 12th Internationa</u>
23-25 June 2005 Page(s):83 - 90
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☐   5. **Surrogate join for massive data on tertiary storage system**
Baoliang Liu; Jianzhong Li; Yanqiu Zhang;
<u>Database Engineering and Applications Symposium, 2004. IDEAS '04. Procee
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Data Engineering, 1995. Proceedings of the Eleventh International Conference
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Dawyndt, P.; Vancanneyt, M.; De Meyer, H.; Swings, J.;
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Volume 17, Issue 8, Aug. 2005 Page(s):1111 - 1126
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☐   **3. Non-blocking Disk-Tape Join Algorithm for Data on Tertiary Storage Syst**
Baoliang Liu; Jianzhong Li; Lei Nie; Yanqiu Zhang;
Computer and Information Technology, 2005. CIT 2005. The Fifth Internationa
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Toyama, M.; Ohara, A.;
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Richardson, B.; Mazlack, L.J.;
Fuzzy Information, 2004. Processing NAFIPS '04. IEEE Annual Meeting of the
Volume 2, 27-30 June 2004 Page(s):641 - 646 Vol.2
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microbial information sources
Dawyndt, P.; Vancanneyt, M.; De Meyer, H.; Swings, J.;
Knowledge and Data Engineering, IEEE Transactions on
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☐   3. **An adaptive algorithm for incremental mining of association rules**
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26-28 Aug. 1998 Page(s):240 - 245
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☐   5. **Set-oriented mining for association rules in relational databases**
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Hunter, J.;
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Volume 13, Issue 1, Jan. 2003 Page(s):49 - 58
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7. **Merging Multiple Data Streams on Common Keys over High Performance**
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8. **Knowledge Creation Opportunities in the Data Mining Process**
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9. **Architecture of sensor based agricultural information system for effectivi
farm activities**
Chaudhary, S.; Sorathia, V.; Laliwala, Z.;
Services Computing, 2004. (SCC 2004). Proceedings. 2004 IEEE Internationa
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10. **Structured Knowledge Source Integration and its applications to informa**
Masters, J.;
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Volume 2, 8-11 July 2002 Page(s):1340 - 1346 vol.2
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11. **Association Pattern Language Modeling**
Chien J.-T. ;
IEEE Transactions on Audio, Speech, and Language Processing : Accepted fc
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Volume PP, Issue 99, 2005 Page(s):1 - 10
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Knowledge Discovery From Distributed And Textual Data - Cho (1999)   (1 citation)   (Correct)

....the large itemsets with confidence greater than the predetermined threshold. **The** first stage, which usually involves counting on the original database, is the most timeconsuming process and thus attracts many researchers efforts in speeding it up. **Popular algorithms such as the AIS [5] and SETM [67] generate candidate itemsets on the fly while reading the data.** These algorithms have the disadvantage of generating and counting too many candidate itemsets that turn out to be small. **Agrawal** and Srikant [3] later on modified the candidate itemset generation so that only itemsets found large in ....

Houtsma M. and Swami A., "*Set-oriented Mining of Association Rules*". Research Report RJ 9567, IBM Almaden Research Center, San Jose, California, 1993.

Mining Association Rules From Market Basket Data.. - Hilderman.. (1998)   (Correct)

....Machine Learning, Itemsets, Association Rules. 1 Introduction The problem of mining association rules from market basket data has recently been an important research topic in the area of knowledge discovery from databases. **It was originally introduced in [2] and studied extensively in [1, 5, 25, 26, 31, 19, 23, 29, 30, 3, 4, 33, 14].** The problem is typically examined in the context of discovering buying patterns from retail sales transactions. **Although** there are many similar data mining applications which can be modelled in this way, we again study the problem using the retail store example because of its intuitive nature ....

....of share for itemsets, and redefine the notions of frequent itemsets and confidence. **We** refer to this extended formalism as the shareconfidence framework for association rules and refer to the new itemset measures as simply share measures. **In this framework, any of the algorithms presented in [2, 3, 16, 19, 22, 23, 29, 30, 31, 32, 33] can used to generate frequent itemsets using our new definition for frequent itemset.** The definitions in this section have been implemented in a data mining system for analyzing market basket data. **This** system is an extension of DB Discover, a software tool for knowledge discovery form databases ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* In Proceedings of the 11th International Conference on Data Engineering (ICDE'95), pages 25--34, 1995.

An Algorithm for Mining Association Rules Using Perfect.. - Özel, Güvenir   (Correct)

....is greater than or equal to the minimum confidence. **However** the first step of association rule mining, finding the frequent itemsets, is very resource consuming task and for that reason, it has been one of the most popular research field in data mining. **Several algorithms, AIS [3] SETM [8], Apriori [4] Direct Hashing and Pruning [5, 9] Partition [10] Sampling [11] and some other parallel algorithms [12] have been developed.** In this study, a fast algorithm based on Direct Hashing and Pruning (DHP) algorithm is proposed. **The** DHP algorithm is described in Section II, our algorithm ....

M. Houtsma and A. Swami, "*Set-Oriented Mining of Association Rules*", Research Report RJ 9567, IBM Almaden Research Center, San Jose, California, (Oct. 1993).

Intension Mining: A New Paradigm in Knowledge Discovery - Gupta, Bhatnagar, Wasan.. (2000)   (Correct)

....cation with no change in semantics. **Data** Mining algorithms operate on previously selected, cleaned and transformed data. **The** choice of the mining algorithm depends on the type of knowledge to be discovered. **Intra**

record links, termed Association Rules can be discovered using algorithms given in [4, 5, 6, 29, 31, 35, 41] etc. Database segmentation can be performed using various clustering techniques [18, 28, 37, 38, 51] etc. **Classi** cation can be performed by inducing either a decision tree or decision rule [1, 3, 8, 21, 23] or by neural network techniques [32] Presentation of the Discovered Knowledge is the ....

M. Houstma and A. Swami. *Set oriented Mining of Association Rules.* In Proceedings of the Int'l Conf. on Data Engineering, pages 25-33, 1995. 64

Discovering Interesting Association Rules in Medical Data - Ordonez, Santana, de Braal (2000)   (Correct)

....are used with basket data. **Medical data sets are more complex and thus present many new challenges. This paper incorporates some ideas from our previous work to mine rules on segmented images [16] Most papers published in the database literature concentrate on optimizing the first phase [18, 7, 12, 13, 14, 19, 17] but a few look at the problem of also improving rule generation (2nd phase) 6, 18, 15] For instance, 14] proposes an algorithm to summarize associations when they are too many.** 7] attacks the problem of inserting transactions on an already mined set and proposes an algorithm that ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* Technical Report RJ 9567, IBM, October 1993.

Fast Algorithms for Mining Association Rules - Agrawal, Srikant (1994)   (848 citations)   (Correct)

....example, D could be a data file, a relational table, or the result of a relational expression. **An algorithm for finding all association rules, henceforth referred to as the AIS algorithm, was presented in [AIS93b] Another algorithm for this task, called the SETM algorithm, has been proposed in [HS93] In this paper, we presenttwo new algorithms, Apriori and AprioriTid, that differ fundamentally from these algorithms.** We present experimental results, using both synthetic and real life data, showing that the proposed algorithms always outperform the earlier algorithms. **The** performance gap is ....

....person who orders a comforter also orders a flat sheet, a fitted sheet, a pillow case, and a ruffle. **The** algorithms in Section 3 generate suchmulti consequent rules. **In Section 4, we show the relative performance of the proposed Apriori and AprioriTid algorithms against the AIS [AIS93b] and SETM [HS93] algorithms.** To make the paper self contained, we include an overview of the AIS and SETM algorithms in this section. **We** also describe how the Apriori and AprioriTid algorithms can be combined into a hybrid algorithm, AprioriHybrid, and demonstrate the scale up properties of this algorithm. **We** ....

[Article contains additional citation context not shown here]

Maurice Houtsma and Arun Swami. *Set-oriented mining of association rules.* Research Report RJ 9567, IBM Almaden ResearchCenter, San Jose, California, October 1993. 30

SQL Based Association Rule Mining using Commercial.. - Yoshizawa.. (2000)   (Correct)

....and credit card fraud indications are widely recognized. **One** method of data mining is finding association rule [1] Basket data analysis is typical of this method. **There are some approaches proposed to mine association rules, 1,2,6,9] some of them are based on relational database standard SQL [3,7,8].** But this kind of mining is known as CPU power demanding application and it has to handle very large amounts of transaction data. **Unfortunately** SQL approach is reported to have drawback in performance although it has many advantages such as seamless integration with existing system and high ....

....required by association rule mining. **This fact motivated us to examine how efficiently SQL based association rule mining can be parallelized and speeded up using commercial parallel database system (IBM DB2 UDB EEE) We propose two techniques to enhance association rule mining query based on SETM [3].** And we have also compared the performance with commercial mining tool (IBM Intelligent Miner) Our performance evaluation shows that we can achieve comparable performance with commercial mining tool using only 4 nodes. **Some** considerable works on effective SQL queries to mine association rule ....

[Article contains additional citation context not shown here]

M. Houtsma, A. Swami. *Set-oriented Mining of Association Rules.* In Proc. of International Conference on Data

Engineering (ICDE), 1995.

Extended Concepts for Association Rule Discovery - Rantzau (1997)   (Correct)

....at most twice. **In** the first scan it generates all candidates and in the second their support is computed. **Apriori** outperforms Partition only when the minimum support threshold is set high. **The** Partition algorithm lends itself to an implementation on parallel computers. **The SETM algorithm [HS95, AS94a] uses SQL to generate frequent itemsets.** Like AIS, candidates are generated while transactions are read from the database. **However,** SETM separates candidate generation from counting. **It** has a worse performance than AIS for both synthetic and real life datasets. **The** algorithm presented in ....

Maurice Houtsma and Arun Swami. *Set-oriented Mining of Association Rules.* In Proceedings of the 11th International Conference on Data Engineering, Taipei, Taiwan, pages 25–33, March 1995.

Performance Evaluation and Optimization of Join Queries.. - Thomas, Chakravarthy (1998)   (2 citations) (Correct)

....objectrelational extensions to execute mining operations. **This** entails transforming the mining operations into database queries and in some cases developing newer techniques that are more appropriate in the database context. **The UDF based (user de ned function) approach in [2] the SETM algorithm [5], the formulation of association rule mining as query ocks [10] and SQL queries for mining [9] all belong to this category.** Two categories of SQL implementations for association rule mining one based purely on SQL 92 and the other using the object relational extensions to SQL (SQL OR) are ....

....= q.tid and q.tid = r.tid We can also use the Subquery approach to generate T 3 if that is less expensive. **T 3 will contain exactly the same tuples produced by subquery Q 3 . The Set oriented Apriori algorithm bears some resemblance with the three way join approach in [9] the SETM algorithm in [5] and the AprioriTid algorithm in [3] In the three way join approach, the temporary table T k stores for each transaction, the identi ers of the candidates it supported.** T k is generated by joining two copies of T k 1 with C k . The generation of F k requires a further join of T k with C k . The ....

[Article contains additional citation context not shown here]

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* In Int'l Conference on Data Engineering, Taipei, Taiwan, March 1995.

Algorithms For Computing Association Rules Using A.. - Graham Goulbourne Frans (2000)   (1 citation) (Correct)

....support for all members of C k , and from this, produces the set L k of interesting sets of size k. **This** is then used to derive the candidate sets C k 1 , using the downward closure property, that all the subsets of any member of C k 1 must be members of L k . **Other algorithms, AIS [1] and SETM [3], have the same general form but differ in the way the candidate sets are derived.** Two aspects of the performance of these algorithms are of concern: the number of passes of the database that are required, which will in general be one greater than the number of attributes in the largest ....

Houtsma, M. and Swami, A. *Set-oriented mining of association rules.* Research Report RJ 9567, IBM Almaden Research Centre, San Jose, October 1993.

Performance Evaluation and Optimization of Join Queries.. - Thomas, Chakravarthy (1998)   (2 citations) (Correct)

....extensions to execute mining operations. **This** entails transforming the mining operations into database queries and in some cases developing newer techniques that are more appropriate in the database context. **The UDF based (user de ned function) approach in [AS96] the SETM algorithm [HS95] the formulation of association rule mining as query ocks [TUA 98] and SQL queries for mining [STA98] all aim at tighter database integration.** STA98] presents a detailed study of the various architectural alternatives for mining data stored in a DBMS. **It** has been reported that for ....

....Section 3.3. **Figure** 11: Comparison of Subquery and Set oriented Apriori approaches In Figure 11, we show

the relative performance of Subquery and Set oriented Apriori approaches for the two datasets. **The chart shows the total time taken for each of the di erent passes. We ran the SETM algorithm [HS95] also for a few support values and found that it is an order of magnitude slower.** Set oriented Apriori performs better than Subquery for all the support values. **The rst two passes of both the approaches are similar and they take approximately** equal amount of time. **The** di erence between ....

Maurice Houtsma and Arun Swami. *Set-oriented mining of association rules.* In Int'l Conference on Data Engineering, Taipei, Taiwan, March 1995.

Incremental Mining of Constrained Associations - Thomas, Chakravarthy (1998)   (6 citations)   (Correct)

....frequent itemsets) generated at each level is based on the observation that if an itemset S appears in c baskets, then any subset of S appears in at least c baskets. **The need for applying association rule mining to data stored in databases data warehouses has motivated researchers to [SK97, HS95, AS96, STA98, TC98, TS98] i) study alternative architectures for mining over data stored in databases, ii) translate association rule mining algorithms to work with relational and object relational databases, ii) optimize the mining algorithms beyond what the current relational query optimizers ....**

Maurice Houtsma and Arun Swami. *Set-oriented mining of association rules.* In Int'l Conference on Data Engineering, Taipei, Taiwan, March 1995.

Parallel Mining of Association Rules - Agrawal, Shafer (1996)   (52 citations)   (Correct)

....data mining is that it will deliver technology that will enable development of a new breed of decision support applications. **Discovering association rules is an important data mining problem [1] Recently, there has been considerable research in designing fast algorithms for this task [1] 3] 5] [6] [8] 12] 9] 11] However, with the exception of [10] the work so far has been concentrated on designing serial algorithms.** Since the databases to be mined are often very large (measured in gigabytes and even terabytes) parallel algorithms are required. **We** present in this paper three parallel ....

....upon the patterns the different transactions support. **This** algorithm also incorporates load balancing. **These algorithms are based upon the serial algorithm Apriori which was first presented in [3] We chose the Apriori algorithm because of its superior performance over the earlier algorithms [1] [6], as shown in [3] We preferred Apriori over AprioriHybrid, a somewhat faster algorithm in [3] because AprioriHybrid is harder to parallelize; the performance of AprioriHybrid is sensitive to heuristically determined parameters.** Furthermore, the performance of Apriori can be made to approximate ....

[Article contains additional citation context not shown here]

Maurice Houtsma and Arun Swami. *Set-oriented mining of association rules.* In Int'l Conference on Data Engineering, Taipei, Taiwan, March 1995.

Parallel SQL Based Association Rule Mining on.. - Pramudiono.. (1999)   (Correct)

....called large itemsets. 2. **Generate** the desired rules using large itemsets. **Since** the first step consumes most of processing time, development of mining algorithm has been concentrated on this step. **In our experiment we employed ordinary standard SQL query that is similar to SETM algorithm [3].**It is shown in figure 1. **CREATE** TABLE SALES (id int, item int) PASS 1 CREATE TABLE C 1 (item 1 int, cnt int) CREATE TABLE R 1 (id int, item 1 int) INSERT INTO C 1 SELECT item AS item 1, COUNT(FROM SALES GROUP BY item HAVING COUNT(min support; INSERT INTO R 1 SELECT ....

M. Houtsma, A. Swami. *Set- oriented Mining of Association Rules.* In Proc. of International Conference on Data Engineering, 1995.

Pincer-Search: An Efficient Algorithm for Discovering the.. - Lin, Kedem (1999)   (Correct)

....Frequent Set Discovery We briefly discuss existing frequent set discovery algorithms in a roughly chronological order. **AIS** and SETM Algorithms The problem of association rule mining was first introduced in [2] An algorithm called AIS was given for discovering the frequent set. **SETM algorithm [13] was later designed to use only**

standard SQL commands to find the frequent set. The Apriori algorithm [3] described above, performs much better than AIS and SETM. **The** OCD Algorithm It is worth adding, that concurrently with the Apriori algorithm, OCD algorithm [19] used the same closure property ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* Research Report RJ 9567, IBM Almaden Research Center, Oct. 1993.

Computing Association Rules Using Partial Totals - Graham Goulbourne Frans (2001)   (2 citations)   (Correct)

....support for all members of C k , and from this, produces the set L k of interesting sets of size k. **This** is then used to derive the candidate sets C k 1 , using the downward closure property, that all the subsets of any member of C k 1 must be members of L k . **Other algorithms, AIS [1] and SETM [3], have the same general form but differ in the way the candidate sets are derived.** Two aspects of the performance of these algorithms are of concern: the number of passes of the database that are required, which will in general be one greater than the number of attributes in the largest ....

Houtsma, M. and Swami, A. *Set-oriented mining of association rules.* Research Report RJ 9567, IBM Almaden Research Centre, San Jose, October 1993. 10

Fast Algorithms for Discovering the Maximum Frequent Set - Lin (1998)   (Correct)

....Itemsets f1,2,3,5g and f1,2,5g were not considered, since the item 5 was not in the transaction. **Two** complicated heuristics, remaining tuples optimization and pruning function optimization, were used to prune candidates. **Unfortunately**, this algorithm still generates too many candidates. **SETM [HS93] algorithm was later designed to use only standard SQL commands to find the frequent set.** However, like AIS, SETM also creates candidates on the fly while reading the database. **Both** algorithms are not efficient, since they generate and count too many unnecessary candidates. 2.4.2 Apriori and OCD ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* Research Report RJ 9567, IBM Almaden Research Center, Oct. 1993.

Integrating Data Mining with Relational DBMS: A.. - Nestorov, Tsur (1999)   (1 citation)   (Correct)

.... that requires consideration: can we achieve a comparable, or at least an acceptable level of performance from these integrated methods when compared to the special purpose external methods This question was previously examined in a more narrow context of association rules and a particular DBMS in [7] and [2] Section 2 of this paper elaborates on the general architectural choices available and their comparison. The idea of flocks [11] was presented as a framework for performing complex data analysis tasks on relational database systems. **The** method consists of a generator of candidate query ....

H. Houtsma and A. Swami. *Set-oriented mining of association rules.* In Proceedings of International Conference on Data Engineering, pages 25–33, Taipei, Taiwan, March 1995.

Efficient Mining for Association Rules with Relational.. - Rajamani, Cox, Iyer, al. (1999)   (3 citations)   (Correct)

....With the (Transaction id, Item) schema the Transaction id value would be repeated for every item bought in that transaction. **The** SC data model would be useful for performing conventional relational queries against items bought in transactions. **Some of the early work in association rule mining [11] propose the use of such relational queries for discovering association rules, and work with this data model.** However, later work [3] have shown significant performance improvement by using Apriori based algorithms that did not use relational queries in their implementation. **But**, to the best of ....

....proposed for inter operability in multi database systems and not for providing the flexibility and functionality required by data mining applications. **Agrawal** and Shim [2] show the benefit of using UDFs for the development of applications tightly coupled with the database engine. **Houtsma and Swami [11] proposed SETM, an SQL based algorithm for association rule mining.** Their algorithm uses simple database operations sorting and mergescan joins. **However**, their joins are more expensive as they are against the input data table and they do not have an efficient candidate set pruning such as ....

M. Houtsma and A. Swami. *Set-oriented Mining of Association Rules.* Technical Report RJ 9567, IBM Almaden Research Center, October 1993.

Mining Association Rules - Cengiz   (Correct)

....with predefined template patterns. **If a found rule matches to any pattern than it is said to be interesting,** otherwise uninteresting. **4 Serial Algorithms Since [AIS93] the introduction of the problem, there has been work on designing algorithms for mining Boolean association rules [AS94] [HS95] [MTV94] SON95] PCY95] The algorithm presented in [AIS93] incorporates buffer management, novel estimation, and pruning techniques to provide efficiency.** This algorithm finds only Boolean association rules. **This** work was later extended to cover quantitative rules [SA95] HF95] Those works try ....

Maurice Houtsma and Arun Swami. *Set-oriented mining of association rules.* In Int'l Conference on Data Engineering, Taipei, Taiwan, March 1995.

Mining for Complex Patterns in Large Databases Using.. - Jermaine, Miller (1998)   (Correct)

....the model representations upon which they rely. **The limitations include restrictions on the type and** characteristics of the data, limiting the accuracy and completeness of the models. 3. **1 Association Rules Association rules have been the most prevalent mining method in the database literature [1, 2, 3, 4, 9, 11, 12, 14, 15, 20, 22, 23].** While very useful in describing certain large scale trends or relationships among the data in very large datasets, association rules are unable to describe certain relationships that have very strong statistical significance but occur in a only a relatively small subset of the data precisely ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* In Proceedings of the International Conference on Data Engineering, pages 25-34, 1995.

Parallel Data Mining for Association Rules on.. - Zaki, Ogihara.. (1996)   (30 citations)   (Correct)

....large itemsets, and in the second pass the support for all these is measured. **The** above algorithms are all specialized black box techniques which do not use any database operations. **Algorithms using only general purpose DBMS systems and relational algebra operations have also been proposed [7, 8].** The work closest to this from the machine learning literature is the KID3 algorithm presented in [12] The main problem with their approach is that it may take exponential time in the worst case as opposed to the polynomial time algorithms presented in the above papers. **There** has been very ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* In RJ 9567. IBM Almaden, Oct. 1993.

Formal Logics of Discovery and Hypothesis Formation By Machine - Hájek, Holena   (Correct)

....tables [5, 9, 31, 32, 55, 56] Scope. **GUHA relates, in particular, to mining association rules. Indeed, if A = fA 1 ; Am g is the set of binary attributes in a database of size k, and if X;Y ae A; X·Y = then the association rule X) Y is significant in the database (according to [1, 2, 27, 28, 40, 47, 54]) if and only if the GUHA sentence i2X A i =B;p i2Y A i holds for the k Theta m dichotomous data matrix formed by the values of the attributes from A.** Here, B;p is a founded version of the generalized quantifier = p mentioned in section 2 (version requiring the frequence a to be at ....

Houtsma, M., and Swami, A. *Set-oriented mining of association rules.* Tech. rep., IBM Almaden Research Center, 1993.

Beyond Market Baskets: Generalizing Association Rules.. - Silverstein, Brin.. (1997)   (40 citations)   (Correct)

....properties, text mining 1. **Introduction One particularly well studied problem in data mining is the search for association rules in market basket data (Agrawal et al. 1993a, Agrawal et al. 1993b, Klemettinen et al. 1994, Mannila et al. 1994, Agrawal and Srikant, 1994, Han and Fu, 1995, Houtsma and Swami, 1995, Park et al. 1995, Srikant and Agrawal, 1995, Savasere et al. 1995, Agrawal et al. 1996, Toivonen, 1996) In this setting, the base information consists of register transactions of retail stores.** The goal is to discover buying patterns such as two or more items that are bought together often. ....

Houtsma, M. and Swami, A. 1995. *Set-oriented mining of association rules*. Proceedings of the International Conference on Data Engineering, pp. 25–34.

Discovering all Most Specific Sentences by Randomized.. - Gunopulos, al. (1997)   (31 citations)   (Correct)

....these candidates , the algorithm calls the function q to check whether really belongs to Th. **This** iterative procedure is performed until no more sentences in Th are found. **This** level wise algorithm has been used in various forms in finding association rules, episodes, sequential rules, etc. **[2, 3, 24, 23, 1, 13, 14, 25].** The drawback with this algorithm is that it always computes the whole set Th(L; r; q) even in the cases where a condensed representation of Th using most specific sentences would be useful. **Given** Th, a sentence 2 Th is a most specific sentence of Th, if for no 2 Th we have OE . Denote ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules*. Research Report RJ 9567, IBM Almaden Research Center, San Jose, California, October 1993.

Query Flocks: A Generalization of Association-Rule Mining - Tsur, Ullman.. (1998)   (43 citations)   (Correct)

....answer to a question like find all the pairs of items that appear in at least c market baskets. 1.3 The Problem With SQL as a Mining Language In principle, we can express a query about pairs of items that appear in a large number of baskets in conventional SQL. **This approach was examined by [HS95], for instance.** The problem is that the right optimizations are beyond the state of the art in commercial database systems. **For** example, Fig. 1 shows how to express the query find all pairs of items that appear together in at least 20 market baskets. 1 There, we join baskets with itself, ...

M. Houtsma and A. Swami, "*Set-oriented mining of association rules*," Proc. Intl. Conf. on Data Engineering, pp. 25--34.

Query Flocks: A Generalization of Association-Rule Mining - Dick Tsur (1998)   (43 citations)   (Correct)

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M. Houtsma and A. Swami, "*Set-oriented mining of association rules*," Proc. Intl. Conf. on Data Engineering, pp. 25--34.

Mining for Strong Negative Associations in a Large Database.. - Ashok Savasere (1998)   (6 citations)   (Correct)

.... of the promising areas of research encompassing databases, statistics and machine learning [6, 12, 15] Recently, there has been considerable interest in finding associations between items in a database of customer transactions, such as the sales data collected at super market check out counters [1, 2, 5, 7, 11, 8, 14, 4]. Association rules identify items that are most often bought along with certain other items by a significant fraction of the customers. **For** example, we may find that 95 of the customers who bought bread also bought milk. **Every** rule must satisfy two user specified constraints: one is a measure ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules*. In Proceedings of the International Conference on Data Engineering, Taipei, Taiwan, March 1995.

Mining Quantitative Association Rules in Large Relational Tables - Srikant, Agrawal (1996)   (201 citations) (Correct)

....supports are counted are new. **We** present our experience with this solution on a real life dataset in Section 6. **1. 3 Related Work Since the introduction of the (Boolean) Association Rules problem in [AIS93] there has been considerable work on designing algorithms for mining such rules [AS94] [HS95] [MTV94] SON95] PCY95] This work was subsequently extended to finding association rules when there is a taxonomy on the items in [SA95] HF95] Related work also includes [PS91] where quantitative rules of the from x = q x)**

y = q y are discovered. However, the antecedent and consequent are ....

Maurice Houtsma and Arun Swami. *Set-oriented mining of association rules.* In Int'l Conference on Data Engineering, Taipei, Taiwan, March 1995.

Fast Sequential and Parallel Algorithms for Association Rule.. - Mueller (1995)   (44 citations)   (Correct)

....paper, rules were restricted to one item in the consequent but allowed any union of items in the antecedent. **This** limitation was not justified by the algorithm itself because it finds all frequent sets, and this information is enough to produce rules without this limitation. 2.3. **2 SETM SETM [22] is designed to use only standard database operations to find frequent sets.** For this reason, it uses its own data representation that stores every itemset supported by a transaction along with the transaction s TID. **Figure** 2.3 shows part of an example run of SETM on a tiny database and ....

Houtsma and Arun Swami. *Set-oriented mining of association rules.* Technical Report RJ 9567, IBM Research Report, Oct. 1993.

An Effective Hash-Based Algorithm for Mining Association Rules - Park, Yu (1995)   (114 citations)   (Correct)

....are referred to as large itemsets. **Once** all large itemsets are obtained, the desired association rules can be generated in a straightforward manner. **Subsequent** work in the literature followed this approach and focused on the large itemset generations. **Various algorithms have been proposed [3, 5, 8] to discover the large itemsets.** Generally speaking, these algorithms first construct a candidate set of large itemsets based on some heuristics, and then discover the subset that indeed contains large itemsets. **This** process can be done iteratively in the sense that the large itemsets discovered ....

M. Houtsma and A. Swami. *Set-Oriented Mining of Association Rules.* Technical Report RJ 9567, IBM Almaden Research Laboratory, San Jose, CA, October 1993.

Integrating Association Rule Mining with Relational Database.. - Sarawagi (1998)   (46 citations)   (Correct)

....proposal makes use of user defined functions (UDFs) in SQL statements to selectively push parts of the computation into the database system. **The** objective was to avoid one at a time record retrieval from the database, saving both the copying and process context switching costs. **The SETM algorithm [10] for finding association rules was expressed in the form of SQL queries.** However, as shown in [3] SETM is not efficient and there are no results reported on running it against a relational DBMS. **Recently,** the problem of expressing the association rules algorithm in SQL has been explored in [20] ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* In Int'l Conference on Data Engineering, Taipei, Taiwan, March 1995.

Evaluation of Sampling for Data Mining of Association Rules - Zaki, Parthasarathy, Li.. (1996)   (16 citations) (Correct)

....large itemsets, and in the second pass the support for all these is measured. **The** above algorithms are all specialized black box techniques which do not use any database operations. **Algorithms using only generalpurpose DBMS systems and relational algebra operations have also been proposed [5, 6].** In this paper we will use the Apriori algorithm to evaluate the effectiveness of sampling for data mining. **We** would like to point out that our results are about sampling, and as such independent of, and equally applicable to any algorithm for mining of association rules. **We** now present a brief ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* In RJ 9567. IBM Almaden, Oct. 1993.

Fast Algorithms for Mining Association Rules - Agrawal, Srikant (1994)   (848 citations)   (Correct)

....example, D could be a data file, a relational table, or the result of a relational expression. **An algorithm for finding all association rules, henceforth referred to as the AIS algorithm, was presented in [AIS93b] Another algorithm for this task, called the SETM algorithm, has been proposed in [HS93] In this paper, we present two new algorithms, Apriori and AprioriTid, that differ fundamentally from these algorithms. We**

present experimental results, using both synthetic and real life data, showing that the proposed algorithms always outperform the earlier algorithms. **The** performance gap is ....

....person who orders a comforter also orders a flat sheet, a fitted sheet, a pillow case, and a ruffle. **The** algorithms in Section 3 generate such multi consequent rules. **In Section 4, we show the relative performance of the proposed Apriori and AprioriTid algorithms against the AIS [AIS93b] and SETM [HS93] algorithms.** To make the paper self contained, we include an overview of the AIS and SETM algorithms in this section. **We** also describe how the Apriori and AprioriTid algorithms can be combined into a hybrid algorithm, AprioriHybrid, and demonstrate the scale up properties of this algorithm. **We** ....

[Article contains additional citation context not shown here]

Maurice Houtsma and Arun Swami. *Set-oriented mining of association rules.* Research Report RJ 9567, IBM Almaden Research Center, San Jose, California, October 1993.

An Efficient Algorithm for Mining Association Rules in Large.. - Ashok Savasere (1995)   (16 citations)   (Correct)

....rule may state that 95 of customers who bought items A and B also bought C and D. **This** type of information may be used to decide catalog design, store layout, product placement, target marketing, etc. **Many algorithms have been discussed in the literature for discovering association rules [1, 8, 2].** One of the key features of all the previous algorithms is that they require multiple passes over the database. **For** disk resident databases, this requires reading the database completely for each pass resulting in a large number of disk reads. **In** these algorithms, the effort spent in performing ....

....is stopped when in some iteration n, no large itemsets are generated. **The** algorithm, in this case, makes n database scans. 2.1 Previous Work The problem of generating association rules was first introduced in [1] and an algorithm called AIS was proposed for mining all association rules. **In [8], an algorithm called SETM was proposed to solve this problem using relational operations in a relational database environment.** In [2] two new algorithms called Apriori and AprioriTid were proposed. **These** algorithms achieved significant improvements over the previous algorithms and were ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* Technical Report RJ 9567, IBM, October 1993.

Fast Algorithms for Mining Association Rules - Agrawal, Srikant (1994)   (848 citations)   (Correct)

....D. **For** example, D could be a data file, a relational table, or the result of a relational expression. **An algorithm for finding all association rules, henceforth referred to as the AIS algorithm, was presented in [4] Another algorithm for this task, called the SETM algorithm, has been proposed in [13].** In this paper, we present two new algorithms, Apriori and AprioriTid, that differ fundamentally from these algorithms. **We** present experimental results showing that the proposed algorithms always outperform the earlier algorithms. **The** performance gap is shown to increase with problem size, and ....

....subsets of I to generate rules with multiple consequents. **Due** to lack of space, we do not discuss this subproblem further, but refer the reader to [5] for a fast algorithm. **In Section 3, we show the relative performance of the proposed Apriori and AprioriTid algorithms against the AIS [4] and SETM [13] algorithms.** To make the paper self contained, we include an overview of the AIS and SETM algorithms in this section. **We** also describe how the Apriori and AprioriTid algorithms can be combined into a hybrid algorithm, AprioriHybrid, and demonstrate the scaleup properties of this algorithm. **We** ....

[Article contains additional citation context not shown here]

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* Research Report RJ 9567, IBM Almaden Research Center, San Jose, California, October 1993.

Levelwise Search and Borders of Theories in Knowledge Discovery - Mannila, Toivonen (1997)   (85 citations) (Correct)

....the rule is fr(X [fAg) fr(X) All rules with frequency higher than a given threshold can be found eoeectively by using a simple algorithm for nding all frequent sets. A set X R is frequent, if fr(X) exceeds the given threshold.

Several algorithms for nding frequent sets have been presented [1, 2, 11, 14, 15, 16, 31, 35, 36, 37, 38]. The problem of nding all frequent sets can be described in our framework as follows. **The** description language L consists of all subsets X of elements of R. **The** selection predicate q(r; X) is true if and only if fr(X) minfr, where minfr is the frequency threshold given by the user. **In the** ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* Research Report RJ 9567, IBM Almaden Research Center, San Jose, California, October 1993.

Parallel Data Mining for Association Rules on.. - Zaki, Ogihara.. (1996)   (30 citations)   (Correct)

....large itemsets, and in the second pass the support for all these is measured. **The** above algorithms are all specialized black box techniques which do not use any database operations. **Algorithms using only general purpose DBMS systems and relational algebra operations have also been proposed [5, 6].** There has been very limited work in parallel implementations of association algorithms. **In** [9] a parallel implementation of the DHP algorithm [8] is presented. **However** only simulation results on a shared nothing or distributed memory machine like IBM SP2 were presented. **Parallel** implementations ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* In RJ 9567. IBM Almaden, Oct. 1993.

Discovering Association Rules based on Image Content - Carlos Ordonez (1999)   (8 citations)   (Correct)

....content by Blobworld. 3.1. **Data** mining based on association rules At this point, we will consider in detail, the problem of finding associations. **The** problem of generating association rules was first introduced in [1] and an algorithm called AIS was proposed for mining all association rules. **In [13], an algorithm called SETM was proposed to solve this problem using relational operations.** In [2] two algorithms called Apriori and AprioriTid were proposed. **These** algorithms achieved significant improvements over the previous algorithms. **The** rule generation process was also extended to include ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* Technical Report RJ 9567, IBM, October 1993.

Mining Generalized Association Rules - Srikant, Agrawal (1995)   (255 citations)   (Correct)

....) Hiking Boots and Clothes) Hiking Boots may Clothes Jackets Footwear Ski Pants Shirts Outerwear Shoes Hiking Boots Figure 1: Example of a Taxonomy not. **The** former may not have minimum support, and the latter may not have minimum confidence. **Earlier work on association rules [1] 2] [5] [6] 7] did not consider the presence of taxonomies and restricted the items in association rules to the leaf level items in the taxonomy.** However, finding rules across different levels of the taxonomy is valuable since: ffl Rules at lower levels may not have minimum support. **Few** people may buy ....

....T 0 , where T 0 contains all the items in T as well as all the ancestors of each items in T . For example, if the transaction contained Jackets, we would add Outerwear and Clothes to get the extended transaction. **We can then run any of the algorithms for mining association rules [1] 2] [5] [6] 7] on the extended transactions to get generalized association rules.** However, this Basic algorithm is not very fast; two more sophisticated algorithms that we propose run 2 to 5 times faster than Basic (and more than 100 times faster on one real life dataset) We describe the Basic ....

[Article contains additional citation context not shown here]

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* In Int'l Conference on Data Engineering, Taipei, Taiwan, March 1995.

Evaluation of Sampling for Data Mining of Association Rules - Zaki, Parthasarathy, Li.. (1996)   (16 citations) (Correct)

....a certain user specified frequency, called minimum support. **The** second step consists of forming implication rules among the large itemsets [3] In this paper we only deal with the computationally intensive first step. **Many algorithms for finding large itemsets have been proposed in the literature [1, 7, 3, 10, 12, 6, 13, 2].** In this paper we will use the Apriori algorithm [2] to evaluate the effectiveness of sampling for data mining. **We** chose

Apriori since it fast and has excellent scale up properties. **We** would like to observe that our results are about sampling, and as such independent of the mining algorithm ....

....algorithm [13] minimizes I O by scanning the database only twice. **In** the first pass it generates the set of all potentially large itemsets, and in the second pass their support is obtained. **Algorithms using only general purpose DBMS systems and relational algebra operations have also been proposed [6, 7].** A theoretical analysis of sampling (using Chernoff bounds) for association rules was presented in [2, 10] We look at this problem in more detail empirically, and compare theory and experimentation. **In** [8] the authors compare sample selection schemes for data mining. **They** make a claim for ....

M. Houtsma and A. Swami. *Set-oriented mining of association rules.* In RJ 9567. IBM Almaden, Oct. 1993.

Itemset Materializing for Fast Mining - Of Association Rules   (Correct)

No context found.

Houtsma M., Swami A., "*Set-Oriented Mining of Association Rules*", Research Report RJ 9567, IBM Almaden Research Center, San Jose, California, USA, October 1993

Similarity Testing Between Heterogeneous Basket Datasets - Li, al. (2002)   (Correct)

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M. Houtsma and A. Swami. *Set-oriented mining of association rules.* Research Report RJ 9567, IBM Almaden Research Center, San Jose, CA, October 1993.

MINTO: A Software Tool for Mining Manufacturing Databases - Haritsa   (Correct)

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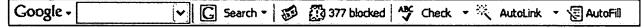<u>Similar pages</u>

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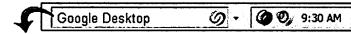mrdm.dantec.nl/procmrdm.pdf - Similar pages

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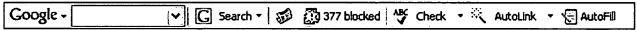db.apache.org/ojb.1_0_2/site.html - 1130k - <u>Cached</u> - <u>Similar pages</u>

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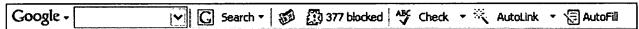
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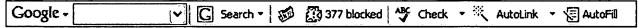<u>Similar pages</u>

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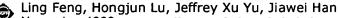
1   Mining inter-transaction associations with templates   ■
        Ling Feng, Hongjun Lu, Jeffrey Xu Yu, Jiawei Han
        November 1999 **Proceedings of the eighth international conference on Information and knowledge management**
        Publisher: ACM Press

        Full text available: 🗎 pdf(1.13 MB)   Additional Information: full citation, abstract, references, citings, index terms

        Multi-dimensional, inter-transaction association rules extend the traditional association rules to describe more general associations among items with multiple properties cross transactions. "After McDonald and Burger King open branches, KFC will open a branch two months later and one mile away" is an example of such rules. Since the number of potential inter-transaction association rules tends to be extremely large, mining inter-transaction associations poses more chall ...

2   A template model for multidimensional inter-transactional association rules   ■
        Ling Feng, Jeffrey Xu Yu, Hongjun Lu, Jiawei Han
        October 2002 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 11 Issue 2
        Publisher: Springer-Verlag New York, Inc.
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        Multidimensional inter-transactional association rules extend the traditional association rules to describe more general associations among items with multiple properties across transactions. "*After McDonald and Burger King open branches, KFC will open a branch two months later and one mile away*" is an example of such rules. Since the number of potential inter-transactional association rules tends to be extremely large, mining inter-transactional associations poses more challe ...

        Keywords: Intra-transactional/inter-transactional association rules, Multidimensional context, Template model

3   Research track: Eliminating noisy information in Web pages for data mining   ■
        Lan Yi, Bing Liu, Xiaoli Li
        August 2003 **Proceedings of the ninth ACM SIGKDD international conference on Knowledge discovery and data mining**
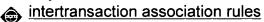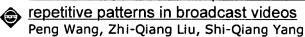   **Publisher**: ACM Press

Full text available: pdf(468.87 KB)   Additional Information: full citation, abstract, references, citings, index terms

A commercial Web page typically contains many information blocks. Apart from the main content blocks, it usually has such blocks as navigation panels, copyright and privacy notices, and advertisements (for business purposes and for easy user access). We call these blocks that are not the main content blocks of the page the noisy blocks. We show that the information contained in these noisy blocks can seriously harm Web data mining. Eliminating these noises is thus of great importance. In this pa ...

Keywords: Web mining, noise detection, noise elimination

4 Beyond intratransaction association analysis: mining multidimensional intertransaction association rules
Hongjun Lu, Ling Feng, Jiawei Han
October 2000 **ACM Transactions on Information Systems (TOIS)**, Volume 18 Issue 4
Publisher: ACM Press

Full text available: pdf(1.31 MB)   Additional Information: full citation, abstract, references, citings, index terms

In this paper, we extend the scope of mining association rules from traditional single-dimensional intratransaction associations, to multidimensional intertransaction associations. Intratransaction associations are the associations among items with the same transaction, where the notion of the transaction could be the items bought by the same customer, the events happened on the same day, and so on. However, an intertransaction association ...

Keywords: association rules, data mining, intra/intertransaction, multidimensional context

5 Industrial and practical experience track paper session 1: The volume and evolution of web page templates
David Gibson, Kunal Punera, Andrew Tomkins
May 2005 **Special interest tracks and posters of the 14th international conference on World Wide Web**
Publisher: ACM Press

Full text available: pdf(249.32 KB)   Additional Information: full citation, abstract, references, index terms

Web pages contain a combination of unique content and *template material*, which is present across multiple pages and used primarily for formatting, navigation, and branding. We study the nature, evolution, and prevalence of these templates on the web. As part of this work, we develop new randomized algorithms for template extraction that perform approximately twenty times faster than existing approaches with similar quality. Our results show that 40--50% of the content on the web is templa ...

Keywords: algorithms, boilerplate, data cleaning, data mining, templates, web mining

6 Poster 3: content track: A probabilistic template-based approach to discovering repetitive patterns in broadcast videos
Peng Wang, Zhi-Qiang Liu, Shi-Qiang Yang
November 2005 **Proceedings of the 13th annual ACM international conference on Multimedia MULTIMEDIA '05**
Publisher: ACM Press

Full text available: pdf(163.58 KB)   Additional Information: full citation, abstract, references, index terms

There are usually repetitive sub-segments in broadcast videos, which may be associated with high-level concepts or events, e.g., news footage, repeated scores in basketball. Unsupervised mining techniques provide generic solutions to discovering such temporal patterns in various video genres, which are currently the subject of great interests to researchers working on multimedia content analysis. In this paper, we propose a novel approach to automatically detecting repetitive patterns in a video ...

Keywords: probabilistic template, repetitive pattern discovery, video mining

7 Description and Analysis: Template detection via data mining and its applications ■
Ziv Bar-Yossef, Sridhar Rajagopalan
May 2002 **Proceedings of the 11th international conference on World Wide Web**
Publisher: ACM Press

Full text available: pdf(404.46 KB)   Additional Information: full citation, abstract, references, citings, index terms

We formulate and propose the template detection problem, and suggest a practical solution for it based on counting frequent item sets. We show that the use of templates is pervasive on the web. We describe three principles, which characterize the assumptions made by hypertext information retrieval (IR) and data mining (DM) systems, and show that templates are a major source of violation of these principles. As a consequence, basic "pure" implementations of simple search algorithms coupled with t ...

Keywords: data mining, hypertext, information retrieval, web searching

8 Analysis of navigation behaviour in web sites integrating multiple information systems ■
Bettina Berendt, Myra Spiliopoulou
March 2000 **The VLDB Journal — The International Journal on Very Large Data Bases,**
Volume 9 Issue 1
Publisher: Springer-Verlag New York, Inc.
Full text available: pdf(281.14 KB)   Additional Information: full citation, abstract, citings, index terms

The analysis of web usage has mostly focused on sites composed of conventional static pages. However, huge amounts of information available in the web come from databases or other data collections and are presented to the users in the form of dynamically generated pages. The query interfaces of such sites allow the specification of many search criteria. Their generated results support navigation to pages of results combining cross-linked data from many sources. For the analysis of visitor naviga ...

Keywords: Conceptual hierarchies, Data mining, Query capabilities, Web databases, Web query interfaces, Web usage mining

9 Extended abstract: Database intrusion detection based on user query frequent ■
itemsets mining with item constraints
Yong Zhong, Xiao-lin Qin
November 2004 **Proceedings of the 3rd international conference on Information security InfoSecu '04**
Publisher: ACM Press
Full text available: pdf(176.00 KB)   Additional Information: full citation, abstract, references, index terms

The paper presents a database intrusion detection algorithm based on user query frequent itemsets with item constraints. Firstly, the paper discusses the method to mine database user query frequent itemsets by using query template. Secondly, the paper discusses the constrained query templates that are used to reduce the number of frequent

itemsets and improve system performance. At last, the paper discusses the algorithm design and its application example.

Keywords: data mining, database security, frequent itemsets, intrusion detection

10 Background for association rules and cost estimate of selected mining algorithms

Jia Liang Han, Ashley W. Plank
November 1996 **Proceedings of the fifth international conference on Information and knowledge management**
Publisher: ACM Press
Full text available: pdf(928.44 KB)   Additional Information: full citation, references, citings, index terms

Keywords: algorithm analysis, association rules, background, data mining, memory management, optimization, scalability

11 An object-oriented approach to multi-level association rule mining

Scott Fortin, Ling Liu
November 1996 **Proceedings of the fifth international conference on Information and knowledge management**
Publisher: ACM Press
Full text available: pdf(996.66 KB)   Additional Information: full citation, references, citings, index terms

12 Bug localization: PR-Miner: automatically extracting implicit programming rules and detecting violations in large software code

Zhenmin Li, Yuanyuan Zhou
September 2005 **Proceedings of the 10th European software engineering conference held jointly with 13th ACM SIGSOFT international symposium on Foundations of software engineering ESEC/FSE-13**
Publisher: ACM Press
Full text available: pdf(228.58 KB)   Additional Information: full citation, abstract, references, index terms

Programs usually follow many *implicit* programming rules, most of which are too tedious to be documented by programmers. When these rules are violated by programmers who are unaware of or forget about them, defects can be easily introduced. Therefore, it is highly desirable to have tools to automatically extract such rules and also to automatically detect violations. Previous work in this direction focuses on simple function-pair based programming rules and additionally requires programmer ...

Keywords: automated specification generation, automated violation detection, data mining for software engineering, pattern recognition, programming rules, static analysis

13 Editorial: special issue on web content mining

Bing Liu, Kevin Chen-Chuan-Chang
December 2004 **ACM SIGKDD Explorations Newsletter**, Volume 6 Issue 2
Publisher: ACM Press
Full text available: pdf(178.32 KB)   Additional Information: full citation, abstract, references

With the phenomenal growth of the Web, there is an everincreasing volume of data and information published in numerous Web pages. The research in Web mining aims to develop new techniques to effectively extract and mine useful knowledge or information

from these Web pages [8]. Due to the heterogeneity and lack of structure of Web data, automated discovery of targeted or unexpected knowledge/information is a challenging task. It calls for novel methods that draw from a wide range of fields spanni ...

14 Intelligent jurisprudence research: a new concept

Rosina Weber

June 1999 **Proceedings of the 7th international conference on Artificial intelligence and law**

Publisher: ACM Press

Full text available: pdf(1.20 MB)   Additional Information: full citation, abstract, references, citings, index terms

Intelligent Jurisprudence Research (IJR) is a concept that consists in performing jurisprudence research with a computational tool that employs Artificial Intelligence (AI) techniques. Jurisprudence research is the search employed by judicial professionals when seeking for past legal situations that may be useful to a legal activity. When humans perform jurisprudence research, they employ analogical reasoning in comparing a given actual situation with past decisions, noting the affinities b ...

Keywords: artificial intelligence and law, case-based reasoning, case-based retrieval, jurisprudence

15 Exploratory mining and pruning optimizations of constrained associations rules

Raymond T. Ng, Laks V. S. Lakshmanan, Jiawei Han, Alex Pang

June 1998 **ACM SIGMOD Record , Proceedings of the 1998 ACM SIGMOD international conference on Management of data SIGMOD '98**, Volume 27 Issue 2

Publisher: ACM Press

Full text available: pdf(1.65 MB)   Additional Information: full citation, abstract, references, citings, index terms

From the standpoint of supporting human-centered discovery of knowledge, the present-day model of mining association rules suffers from the following serious shortcomings: (i) lack of user exploration and control, (ii) lack of focus, and (iii) rigid notion of relationships. In effect, this model functions as a black-box, admitting little user interaction in between. We propose, in this paper, an architecture that opens up the black-box, and supports constraint-based, human-centered explorat ...

16 Towards on-line analytical mining in large databases

Jiawei Han

March 1998 **ACM SIGMOD Record**, Volume 27 Issue 1

Publisher: ACM Press

Full text available: pdf(387.04 KB)   Additional Information: full citation, abstract, citings, index terms

Great efforts have been paid in the Intelligent Database Systems Research Lab for the research and development of efficient data mining methods and construction of on-line analytical data mining systems.Our work has been focused on the integration of data mining and OLAP technologies and the development of scalable, integrated, and multiple data mining functions. A data mining system, DBMiner, has been developed for interactive mining of multiple-level knowledge in large relational databases and ...

17 Industrial/government track: Capturing best practice for microarray gene expression data analysis

Gregory Piatetsky-Shapiro, Tom Khabaza, Sridhar Ramaswamy

August 2003 **Proceedings of the ninth ACM SIGKDD international conference on Knowledge discovery and data mining**

Publisher: ACM Press

Full text available: pdf(874.16 KB)   Additional Information: full citation, abstract, references, index terms

Analyzing gene expression data from microarray devices has many important application in medicine and biology, but presents significant challenges to data mining. Microarray data typically has many attributes (genes) and few examples (samples), making the process of correctly analyzing such data difficult to formulate and prone to common mistakes. For this reason it is unusually important to capture and record good practices for this form of data mining. This paper presents a process for analyzi ...

Keywords: Clementine, application template, data mining process, gene expression, microarrays

18 Poster papers - short papers: Extracting unstructured data from template generated web documents
Ling Ma, Nazli Goharian, Abdur Chowdhury, Misun Chung
November 2003 **Proceedings of the twelfth international conference on Information and knowledge management**
Publisher: ACM Press

Full text available: pdf(210.48 KB)   Additional Information: full citation, abstract, references, citings, index terms

We propose a novel approach that identifies web page templates and extracts the unstructured data. Extracting only the body of the page and eliminating the template increases the retrieval precision for the queries that generate irrelevant results. We believe that by reducing the number of irrelevant results; the users are encouraged to go back to a given site to search. Our experimental results on several different web sites and on the whole cnnfn collection demonstrate the feasibility of our a ...

Keywords: automatic template removal, information retrieval, retrieval accuracy, text extraction

19 Research track poster: Simultaneous optimization of complex mining tasks with a knowledgeable cache
Ruoming Jin, Kaushik Sinha, Gagan Agrawal
August 2005 **Proceeding of the eleventh ACM SIGKDD international conference on Knowledge discovery in data mining KDD '05**
Publisher: ACM Press
Full text available: pdf(750.91 KB)   Additional Information: full citation, abstract, references, index terms

With an increasing use of data mining tools and techniques, we envision that a Knowledge Discovery and Data Mining System (KDDMS) will have to support and optimize for the following scenarios: 1) *Sequence of Queries:* A user may analyze one or more datasets by issuing a sequence of related complex mining queries, and 2) *Multiple Simultaneous Queries:* Several users may be analyzing a set of datasets concurrently, and may issue related complex queries.This paper presents a systematic ...

Keywords: frequent pattern mining, knowledgeable cache, multiple query optimization

20 Bug localization: DynaMine: finding common error patterns by mining software revision histories
Benjamin Livshits, Thomas Zimmermann
September 2005 **Proceedings of the 10th European software engineering conference held jointly with 13th ACM SIGSOFT international symposium on Foundations of software engineering ESEC/FSE-13**

Publisher: ACM Press

Full text available: [pdf(182.92 KB)](#)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>index terms</u>

A great deal of attention has lately been given to addressing software bugs such as errors in operating system drivers or security bugs. However, there are many other lesser known errors specific to individual applications or APIs and these violations of application-specific coding rules are responsible for a multitude of errors. In this paper we propose DynaMine, a tool that analyzes source code check-ins to find highly correlated method calls as well as common bug fixes in order to automatical ...

Keywords: coding patterns, data mining, dynamic analysis, error patterns, one-line check-ins, revision histories, software bugs

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1   Design patterns for sorting
Dung "Zung" Nguyen, Stephen B. Wong
February 2001 **ACM SIGCSE Bulletin , Proceedings of the thirty-second SIGCSE technical symposium on Computer Science Education SIGCSE '01**, Volume 33 Issue 1
Publisher: ACM Press

Full text available: 📄 pdf(78.20 KB)   Additional Information: full citation, abstract, references, citings, index terms

Drawing on Merritt's divide-and-conquer sorting taxonomy [1], we model comparison-based sorting as an abstract class with a template method to perform the sort by relegating the splitting and joining of arrays to its concrete subclasses. Comparison on objects is carried out via an abstract ordering strategy. This reduces code complexity and simplifies the analyses of the various concrete sorting algorithms. Performance measurements and visualizations can be added without modifying any code by ut ...

2   Fast detection of communication patterns in distributed executions
Thomas Kunz, Michiel F. H. Seuren
November 1997 **Proceedings of the 1997 conference of the Centre for Advanced Studies on Collaborative research**
Publisher: IBM Press

Full text available: 📄 pdf(4.21 MB)   Additional Information: full citation, abstract, references, index terms

Understanding distributed applications is a tedious and difficult task. Visualizations based on process-time diagrams are often used to obtain a better understanding of the execution of the application. The visualization tool we use is Poet, an event tracer developed at the University of Waterloo. However, these diagrams are often very complex and do not provide the user with the desired overview of the application. In our experience, such tools display repeated occurrences of non-trivial commun ...

3   Query evaluation techniques for large databases
Goetz Graefe
June 1993 **ACM Computing Surveys (CSUR)**, Volume 25 Issue 2
Publisher: ACM Press

Full text available: 📄 pdf(9.37 MB)   Additional Information: full citation, abstract, references, citings, index terms, review
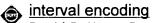
Database management systems will continue to manage large data volumes. Thus, efficient algorithms for accessing and manipulating large sets and sequences will be

required to provide acceptable performance. The advent of object-oriented and extensible database systems will not solve this problem. On the contrary, modern data models exacerbate the problem: In order to manipulate large sets of complex objects as efficiently as today's database systems manipulate simple records, query-processi ...

Keywords: complex query evaluation plans, dynamic query evaluation plans, extensible database systems, iterators, object-oriented database systems, operator model of parallelization, parallel algorithms, relational database systems, set-matching algorithms, sort-hash duality

4   XML query processing II: A comprehensive XQuery to SQL translation using dynamic interval encoding

David DeHaan, David Toman, Mariano P. Consens, M. Tamer Özsu

June 2003 **Proceedings of the 2003 ACM SIGMOD international conference on Management of data**

Publisher: ACM Press

Full text available: pdf(242.20 KB)   Additional Information: full citation, abstract, references, citings, index terms

The W3C XQuery language recommendation, based on a hierarchical and ordered document model, supports a wide variety of constructs and use cases. There is a diversity of approaches and strategies for evaluating XQuery expressions, in many cases only dealing with limited subsets of the language. In this paper we describe an implementation approach that handles XQuery with arbitrarily-nested FLWR expressions, element constructors and built-in functions (including structural comparisons). Our propos ...

5   External memory algorithms and data structures: dealing with **massive data**

Jeffrey Scott Vitter
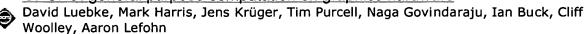
June 2001 **ACM Computing Surveys (CSUR)**, Volume 33 Issue 2

Publisher: ACM Press

Full text available: pdf(828.46 KB)   Additional Information: full citation, abstract, references, citings, index terms

Data sets in large applications are often too massive to fit completely inside the computers internal memory. The resulting input/output communication (or I/O) between fast internal memory and slower external memory (such as disks) can be a major performance bottleneck. In this article we survey the state of the art in the design and analysis of external memory (or EM) algorithms and data structures, where the goal is to exploit locality in order to reduce the I/O costs. We consider a varie ...

Keywords: B-tree, I/O, batched, block, disk, dynamic, extendible hashing, external memory, hierarchical memory, multidimensional access methods, multilevel memory, online, out-of-core, secondary storage, sorting

6   GPGPU: general purpose computation on graphics hardware

David Luebke, Mark Harris, Jens Krüger, Tim Purcell, Naga Govindaraju, Ian Buck, Cliff Woolley, Aaron Lefohn

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available: pdf(63.03 MB)   Additional Information: full citation, abstract

The graphics processor (GPU) on today's commodity video cards has evolved into an extremely powerful and flexible processor. The latest graphics architectures provide tremendous memory bandwidth and computational horsepower, with fully programmable

vertex and pixel processing units that support vector operations up to full IEEE floating point precision. High level languages have emerged for graphics hardware, making this computational power accessible. Architecturally, GPUs are highly parallel s ...

7   Applications: Dynamic coordination of information management services for processing dynamic web content
In-Young Ko, Ke-Thia Yao, Robert Neches
May 2002   **Proceedings of the 11th international conference on World Wide Web**
Publisher: ACM Press

Full text available: pdf(1.15 MB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

Dynamic Web content provides us with time-sensitive and continuously changing data. To glean up-to-date information, users need to regularly browse, collect and analyze this Web content. Without proper tool support this information management task is tedious, time-consuming and error prone, especially when the quantity of the dynamic Web content is large, when many information management services are needed to analyze it, and when underlying services/network are not completely reliable. This pap ...

Keywords: dynamic service coordination, dynamic web content, scalable component-based software systems, semantic interoperability, web information management systems

8   Query optimization I: Access paths in the "Abe" statistical query facility
Anthony Klug
June 1982 **Proceedings of the 1982 ACM SIGMOD international conference on Management of data SIGMOD '82**
Publisher: ACM Press
Full text available: pdf(1.07 MB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>

An increasingly important part of information processing today involves the taking of counts, sums, averages, and other statistical or aggregate quantities. The "Abe" query language is designed to make formulation of complicated aggregations simple. Access path selection in Abe finds efficient ways to execute these complicated queries. Access paths for Abe queries perform "aggregate joins", that is, they compute aggregate quantities at the same time as they join subqueries with parent queries. T ...

9   Level set and PDE methods for computer graphics
David Breen, Ron Fedkiw, Ken Museth, Stanley Osher, Guillermo Sapiro, Ross Whitaker
August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**
Publisher: ACM Press
Full text available: pdf(17.07 MB)   Additional Information: <u>full citation</u>, <u>abstract</u>

Level set methods, an important class of partial differential equation (PDE) methods, define dynamic surfaces implicitly as the level set (iso-surface) of a sampled, evolving nD function. The course begins with preparatory material that introduces the concept of using partial differential equations to solve problems in computer graphics, geometric modeling and computer vision. This will include the structure and behavior of several different types of differential equations, e.g. the level set eq ...

10   Special issue on prototypes of deductive database systems: The aditi deductive database system
Jayen Vaghani, Kotagiri Ramamohanarao, David B. Kemp, Zoltan Somogyi, Peter J. Stuckey, Tim S. Leask, James Harland

April 1994 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 3 Issue 2
Publisher: Springer-Verlag New York, Inc.
Full text available: 🔨 pdf(2.67 MB)   Additional Information: full citation, abstract, references, citings

Deductive databases generalize relational databases by providing support for recursive views and non-atomic data. Aditi is a deductive system based on the client-server model; it is inherently multi-user and capable of exploiting parallelism on shared-memory multiprocessors. The back-end uses relational technology for efficiency in the management of disk-based data and uses optimization algorithms especially developed for the bottom-up evaluation of logical queries involving recursion. The front ...

Keywords: implementation, logic, multi-user, parallelism, relational database

11 Concurrent object-oriented programming

Gul Agha
September 1990 **Communications of the ACM**, Volume 33 Issue 9
Publisher: ACM Press

Full text available: 🔨 pdf(2.06 MB)   Additional Information: full citation, abstract, references, citings, index terms

Three significant trends have underscored the central role of concurrency in computing. First, there is increased use of interacting processes by individual users, for example, application programs running on X windows. Second, workstation networks have become a cost-effective mechanism for resource sharing and distributed problem solving. For example, loosely coupled problems, such as finding all the factors of large prime numbers, have been solved by utilizing ideal cycles on networks of ...

12 Computational strategies for object recognition

Paul Suetens, Pascal Fua, Andrew J. Hanson
March 1992 **ACM Computing Surveys (CSUR)**, Volume 24 Issue 1
Publisher: ACM Press

Full text available: 🔨 pdf(6.37 MB)   Additional Information: full citation, abstract, references, citings, index terms, review

This article reviews the available methods for automated identification of objects in digital images. The techniques are classified into groups according to the nature of the computational strategy used. Four classes are proposed: (1) the simplest strategies, which work on data appropriate for feature vector classification, (2) methods that match models to symbolic data structures for situations involving reliable data and complex models, (3) approaches that fit models to the photometry and ...

Keywords: image understanding, model-based vision, object recognition

13 Graphical query interfaces for semistructured data: the QURSED system

Michalis Petropoulos, Yannis Papakonstantinou, Vasilis Vassalos
May 2005 **ACM Transactions on Internet Technology (TOIT)**, Volume 5 Issue 2
Publisher: ACM Press
Full text available: 🔨 pdf(6.88 MB)   Additional Information: full citation, abstract, references, index terms

We describe the QURSED system for the declarative specification and automatic generation of Web-based query forms and reports (*QFRs*) for semistructured XML data. In QURSED, a *QFR* is formally described by its query set specification (*QSS*) which captures the complex query and reporting *capabilities* of the *QFR* and the associations of the query set specification with visual elements that implement these capabilities on a Web page.

The design-time component of QURSE ...

14 Concepts and paradigms of object-oriented programming

Peter Wegner
August 1990 **ACM SIGPLAN OOPS Messenger**, Volume 1 Issue 1
Publisher: ACM Press
Full text available: pdf(5.52 MB)   Additional Information: full citation, abstract, citings, index terms

> We address the following questions for object-oriented programming: *What is it?What are its goals?What are its origins?What are its paradigms?What are its design alternatives? What are its models of concurrency?What are its formal computational models?What comes after object-oriented programming?*Starting from software engineering goals, we examine the origins and paradigms of object-oriented programming, explore its language design alternativ ...

15 XML parsing and stylesheets: Compiling XSLT 2.0 into XQuery 1.0

Achille Fokoue, Kristoffer Rose, Jérôme Siméon, Lionel Villard
May 2005 **Proceedings of the 14th international conference on World Wide Web**
Publisher: ACM Press
Full text available: pdf(143.18 KB)   Additional Information: full citation, abstract, references, index terms

> As XQuery is gathering momentum as the standard query language for XML, there is a growing interest in using it as an integral part of the XML application development infrastructure. In that context, one question which is often raised is how well XQuery interoperates with other XML languages, and notably with XSLT. XQuery 1.0 [16] and XSLT 2.0 [7] share a lot in common: they share XPath 2.0 as a common sub-language and have the same expressiveness. However, they are based on fairly different pro ...

> **Keywords**: Web services, XML, XQuery, XSLT

16 WSQ/DSQ: a practical approach for combined querying of databases and the Web

Roy Goldman, Jennifer Widom
May 2000 **ACM SIGMOD Record , Proceedings of the 2000 ACM SIGMOD international conference on Management of data SIGMOD '00**, Volume 29 Issue 2
Publisher: ACM Press
Full text available: pdf(223.65 KB)   Additional Information: full citation, abstract, references, citings, index terms

> We present WSQ/DSQ (pronounced "wisk-disk"), a new approach for combining the query facilities of traditional databases with existing search engines on the Web. WSQ, for *Web-Supported (Database) Queries*, leverages results from Web searches to enhance SQL queries over a relational database. DSQ, for *Database-Supported (Web) Queries*, uses information stored in the database to enhance and explain Web searches. This paper focuses primarily on WSQ, describing a simple, lo ...

17 Research sessions: XML II: Approximate XML joins

Sudipto Guha, H. V. Jagadish, Nick Koudas, Divesh Srivastava, Ting Yu
June 2002 **Proceedings of the 2002 ACM SIGMOD international conference on Management of data SIGMOD '02**
Publisher: ACM Press
Full text available: pdf(1.25 MB)   Additional Information: full citation, abstract, references, citings, index terms

> XML is widely recognized as the data interchange standard for tomorrow, because of its ability to represent data from a wide variety sources. Hence, XML is likely to be the format through which data from multiple sources is integrated.In this paper we study the

problem of integrating XML data sources through correlations realized as join operations.
A challenging aspect of this operation is the XML document structure. Two documents
might convey approximately or exactly the same information but m ...

18 Optimizing object queries using an effective calculus

Leonidas Fegaras, David Maier
December 2000 **ACM Transactions on Database Systems (TODS)**, Volume 25 Issue 4
Publisher: ACM Press

Full text available: pdf(641.65 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>, <u>review</u>

Object-oriented databases (OODBs) provide powerful data abstractions and modeling
facilities, but they generally lack a suitable framework for query processing and
optimization. The development of an effective query optimizer is one of the key factors for
OODB systems to successfully compete with relational systems, as well as to meet the
performance requirements of many nontraditional applications. We propose an effective
framework with a solid theoretical basis for optimizing OODB query I ...

Keywords: nested relations, object-oriented databases, query decorrelation, query
optimization

19 Model-based recognition in robot vision

Roland T. Chin, Charles R. Dyer
March 1986 **ACM Computing Surveys (CSUR)**, Volume 18 Issue 1
Publisher: ACM Press

Full text available: pdf(4.94 MB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>, <u>review</u>

This paper presents a comparative study and survey of model-based object-recognition
algorithms for robot vision. The goal of these algorithms is to recognize the identity,
position, and orientation of randomly oriented industrial parts. In one form this is
commonly referred to as the "bin-picking" problem, in which the parts to be recognized
are presented in a jumbled bin. The paper is organized according to 2-D, 2½-D, and 3-D
object representations, which are used as the basis for ...

20 Query optimization in the presence of limited access patterns

Daniela Florescu, Alon Levy, Ioana Manolescu, Dan Suciu
June 1999 **ACM SIGMOD Record , Proceedings of the 1999 ACM SIGMOD international
conference on Management of data SIGMOD '99**, Volume 28 Issue 2
Publisher: ACM Press

Full text available: pdf(1.66 MB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

We consider the problem of query optimization in the presence of limitations on access
patterns to the data (i.e., when one must provide values for one of the attributes of a
relation in order to obtain tuples). We show that in the presence of limited access patterns
we must search a space of annotated query plans, where the annotations describe the
inputs that must be given to the plan. We describe a theoretical and experimental
analysis of the resulting search space and a ...

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1 Data mining: Mining the peanut gallery: opinion extraction and semantic classification ◼
of product reviews
Kushal Dave, Steve Lawrence, David M. Pennock
May 2003 **Proceedings of the 12th international conference on World Wide Web**
Publisher: ACM Press

Full text available: 🔖 pdf(327.95 KB)   Additional Information: full citation, abstract, references, citings, index
                                                                        terms

> The web contains a wealth of product reviews, but sifting through them is a daunting
> task. Ideally, an opinion mining tool would process a set of search results for a given
> item, generating a list of product attributes (quality, features, etc.) and aggregating
> opinions about each of them (poor, mixed, good). We begin by identifying the unique
> properties of this problem and develop a method for automatically distinguishing between
> positive and negative reviews. Our classifier draws on information ...

> **Keywords:** document classification, opinion mining

2 Poster 3: content track: A probabilistic template-based approach to discovering ◼
repetitive patterns in broadcast videos
Peng Wang, Zhi-Qiang Liu, Shi-Qiang Yang
November 2005 **Proceedings of the 13th annual ACM international conference on**
                Multimedia MULTIMEDIA '05
Publisher: ACM Press
Full text available: 🔖 pdf(163.58 KB)   Additional Information: full citation, abstract, references, index terms

> There are usually repetitive sub-segments in broadcast videos, which may be associated
> with high-level concepts or events, e.g., news footage, repeated scores in basketball.
> Unsupervised mining techniques provide generic solutions to discovering such temporal
> patterns in various video genres, which are currently the subject of great interests to
> researchers working on multimedia content analysis. In this paper, we propose a novel
> approach to automatically detecting repetitive patterns in a video ...

> **Keywords:** probabilistic template, repetitive pattern discovery, video mining

3 Fast detection of communication patterns in distributed executions ◼
Thomas Kunz, Michiel F. H. Seuren

November 1997 **Proceedings of the 1997 conference of the Centre for Advanced Studies on Collaborative research**
Publisher: IBM Press
Full text available: pdf(4.21 MB)   Additional Information: full citation, abstract, references, index terms

Understanding distributed applications is a tedious and difficult task. Visualizations based on process-time diagrams are often used to obtain a better understanding of the execution of the application. The visualization tool we use is Poet, an event tracer developed at the University of Waterloo. However, these diagrams are often very complex and do not provide the user with the desired overview of the application. In our experience, such tools display repeated occurrences of non-trivial commun ...

4   Mining semantics for large scale integration on the web: evidences, insights, and challenges
Kevin Chen-Chuan Chang, Bin He, Zhen Zhang
December 2004 **ACM SIGKDD Explorations Newsletter**, Volume 6 Issue 2
Publisher: ACM Press
Full text available: pdf(466.64 KB)   Additional Information: full citation, abstract, references

The Web has been rapidly "deepened" -- with myriad searchable databases online, where data are hidden behind query interfaces. Toward large scale integration over this "deep Web," we are facing a new challenge- With its dynamic and ad-hoc nature, such large scale integration mandates *dynamic semantics discovery.* That is, we must *on-the-fly* cope with "semantics" of dynamically discovered sources without pre-configured source-specific knowledge. To tackle this challenge, our initial ...

5   Bug localization: DynaMine: finding common error patterns by mining software revision histories
Benjamin Livshits, Thomas Zimmermann
September 2005 **Proceedings of the 10th European software engineering conference held jointly with 13th ACM SIGSOFT international symposium on Foundations of software engineering ESEC/FSE-13**
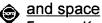**Publisher:** ACM Press
Full text available: pdf(182.92 KB)   Additional Information: full citation, abstract, references, index terms

A great deal of attention has lately been given to addressing software bugs such as errors in operating system drivers or security bugs. However, there are many other lesser known errors specific to individual applications or APIs and these violations of application-specific coding rules are responsible for a multitude of errors. In this paper we propose DynaMine, a tool that analyzes source code check-ins to find highly correlated method calls as well as common bug fixes in order to automatical ...

Keywords: coding patterns, data mining, dynamic analysis, error patterns, one-line check-ins, revision histories, software bugs

6   Exploration mining in diabetic patients databases: findings and conclusions
Wynne Hsu, Mong Li Lee, Bing Liu, Tok Wang Ling
August 2000 **Proceedings of the sixth ACM SIGKDD international conference on Knowledge discovery and data mining**
Publisher: ACM Press
Full text available: pdf(136.53 KB)   Additional Information: full citation, references, citings, index terms

7

Articles on microarray data mining: Towards interactive exploration of gene

expression patterns
Daxin Jiang, Jian Pei, Aidong Zhang
December 2003 **ACM SIGKDD Explorations Newsletter**, Volume 5 Issue 2
Publisher: ACM Press
Full text available: pdf(527.68 KB)   Additional Information: full citation, abstract, references

> Analyzing coherent gene expression patterns is an important task in bioinformatics research and biomedical applications. Recently, various clustering methods have been adapted or proposed to identify clusters of co-expressed genes and recognize coherent expression patterns as the centroids of the clusters. However, the interpretation of co-expressed genes and coherent patterns mainly depends on the domain knowledge, which presents several challenges for coherent pattern mining and cannot be solv ...

8 Bug localization: PR-Miner: automatically extracting implicit programming rules and detecting violations in large software code
Zhenmin Li, Yuanyuan Zhou
September 2005 **Proceedings of the 10th European software engineering conference held jointly with 13th ACM SIGSOFT international symposium on Foundations of software engineering ESEC/FSE-13**
Publisher: ACM Press
Full text available: pdf(228.58 KB)   Additional Information: full citation, abstract, references, index terms

> Programs usually follow many *implicit* programming rules, most of which are too tedious to be documented by programmers. When these rules are violated by programmers who are unaware of or forget about them, defects can be easily introduced. Therefore, it is highly desirable to have tools to automatically extract such rules and also to automatically detect violations. Previous work in this direction focuses on simple function-pair based programming rules and additionally requires programmer ...

> **Keywords**: automated specification generation, automated violation detection, data mining for software engineering, pattern recognition, programming rules, static analysis

9 Poster papers: Finding surprising patterns in a time series database in linear time and space
Eamonn Keogh, Stefano Lonardi, Bill 'Yuan-chi' Chiu
July 2002 **Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining**
Publisher: ACM Press
Full text available: pdf(686.15 KB)   Additional Information: full citation, abstract, references, citings, index terms

> The problem of finding a specified pattern in a time series database (i.e. query by content) has received much attention and is now a relatively mature field. In contrast, the important problem of enumerating all surprising or interesting patterns has received far less attention. This problem requires a meaningful definition of "surprise", and an efficient search technique. All previous attempts at finding surprising patterns in time series use a very limited notion of surprise, and/or do not sc ...

> **Keywords**: Markov Model, anomaly detection, feature extraction, novelty detection, suffix tree, time series

10 Background for association rules and cost estimate of selected mining algorithms
Jia Liang Han, Ashley W. Plank
November 1996 **Proceedings of the fifth international conference on Information and knowledge management**

Publisher: ACM Press
Full text available: [] pdf(928.44 KB)   Additional Information: <u>full citation</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

Keywords: algorithm analysis, association rules, background, data mining, memory management, optimization, scalability

11 <u>Patterns and aspects: Detecting higher-level similarity patterns in programs</u>

Hamid Abdul Basit, Stan Jarzabek

September 2005 **Proceedings of the 10th European software engineering conference held jointly with 13th ACM SIGSOFT international symposium on Foundations of software engineering ESEC/FSE-13**

Publisher: ACM Press
Full text available: [] pdf(641.23 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>index terms</u>

Cloning in software systems is known to create problems during software maintenance. Several techniques have been proposed to detect the same or similar code fragments in software, so-called *simple clones*. While the knowledge of simple clones is useful, detecting design-level similarities in software could ease maintenance even further, and also help us identify reuse opportunities. We observed that recurring patterns of simple clones - so-called *structural clones* - often indicate ...

Keywords: clone detection, similarity patterns, software clones

12 <u>Industrial and practical experience track paper session 1: The volume and evolution of web page templates</u>

David Gibson, Kunal Punera, Andrew Tomkins

May 2005 **Special interest tracks and posters of the 14th international conference on World Wide Web**

Publisher: ACM Press
Full text available: [] pdf(249.32 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>index terms</u>

Web pages contain a combination of unique content and *template material*, which is present across multiple pages and used primarily for formatting, navigation, and branding. We study the nature, evolution, and prevalence of these templates on the web. As part of this work, we develop new randomized algorithms for template extraction that perform approximately twenty times faster than existing approaches with similar quality. Our results show that 40--50% of the content on the web is templa ...

Keywords: algorithms, boilerplate, data cleaning, data mining, templates, web mining

13 <u>Web and e-business application: Application run time estimation: a quality of service metric for web-based data mining services</u>

Shonali Krishnaswamy, Seng Wai Loke, Arkady Zaslavsky

March 2002 **Proceedings of the 2002 ACM symposium on Applied computing**

Publisher: ACM Press
Full text available: [] pdf(685.04 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

The emergence of Application Service Providers (ASP) hosting Internet-based data mining services is being seen as a viable alternative for organisations that value their knowledge resources but are constrained by the high cost of data mining software. Response time is an important Quality of Service (QoS) metric for web-based data mining service

providers. The ability to estimate the response time of data mining algorithms apriori benefits both clients and service providers. The advantage for th ...

Keywords: application run time estimation, data mining e-services, quality of service, rough sets

14 Emergent web patterns: The connectivity sonar: detecting site functionality by structural patterns

Einat Amitay, David Carmel, Adam Darlow, Ronny Lempel, Aya Soffer

August 2003 **Proceedings of the fourteenth ACM conference on Hypertext and hypermedia**

Publisher: ACM Press

Full text available: pdf(153.40 KB) Additional Information: full citation, abstract, references, citings, index terms

Web sites today serve many different functions, such as corporate sites, search engines, e-stores, and so forth. As sites are created for different purposes, their structure and connectivity characteristics vary. However, this research argues that sites of similar role exhibit similar structural patterns, as the functionality of a site naturally induces a typical hyperlinked structure and typical connectivity patterns to and from the rest of the Web. Thus, the functionality of Web sites is refle ...

Keywords: link analysis, web IR, web graphs

15 Sequence mining in categorical domains: incorporating constraints

Mohammed J. Zaki

November 2000 **Proceedings of the ninth international conference on Information and knowledge management**

Publisher: ACM Press

Full text available: pdf(622.26 KB) Additional Information: full citation, references, citings, index terms

16 Computing curricula 2001

September 2001 **Journal on Educational Resources in Computing (JERIC)**

Publisher: ACM Press

Full text available: pdf(613.63 KB)
html(2.78 KB) Additional Information: full citation, references, citings, index terms

17 Research track: Eliminating noisy information in Web pages for data mining

Lan Yi, Bing Liu, Xiaoli Li

August 2003 **Proceedings of the ninth ACM SIGKDD international conference on Knowledge discovery and data mining**

Publisher: ACM Press

Full text available: pdf(468.87 KB) Additional Information: full citation, abstract, references, citings, index terms

A commercial Web page typically contains many information blocks. Apart from the main content blocks, it usually has such blocks as navigation panels, copyright and privacy notices, and advertisements (for business purposes and for easy user access). We call these blocks that are not the main content blocks of the page the noisy blocks. We show that the information contained in these noisy blocks can seriously harm Web data mining. Eliminating these noises is thus of great importance. In this pa ...

Keywords: Web mining, noise detection, noise elimination

18 Web services and performance evaluation: Indexing web access-logs for pattern queries

Alexandros Nanopoulos, Yannis Manolopoulos, Maciej Zakrzewicz, Tadeusz Morzy
November 2002 **Proceedings of the 4th international workshop on Web information and data management**

Publisher: ACM Press

Full text available: pdf(187.24 KB)   Additional Information: full citation, abstract, references, index terms

> In this paper, we develop a new indexing method for large web access-logs. We are concerned with pattern queries, which advocate the search for access sequences that contain certain query patterns. This kind of queries find applications in processing web-log mining results (e.g., finding typical/atypical access-sequences). The proposed method focuses on scalability to web-logs' sizes. For this reason, we examine the gains due to signature-trees, which can further improve the scalability to very ...

19 Knowledge discovery in data warehouses

Themistoklis Palpanas
September 2000 **ACM SIGMOD Record**, Volume 29 Issue 3

Publisher: ACM Press

Full text available: pdf(240.77 KB)   Additional Information: full citation, abstract, citings, index terms

> As the size of data warehouses increase to several hundreds of gigabytes or terabytes, the need for methods and tools that will automate the process of knowledge extraction, or guide the user to subsets of the dataset that are of particular interest, is becoming prominent. In this survey paper we explore the problem of identifying and extracting interesting knowledge from large collections of data residing in data warehouses, by using data mining techniques. Such techniques have the ability to i ...

20 Sequence Mining: Efficient and robust feature extraction and pattern matching of time series by a lattice structure

Polly Wan Po Man, Man Hon Wong
October 2001 **Proceedings of the tenth international conference on Information and knowledge management**

Publisher: ACM Press

Full text available: pdf(1.48 MB)   Additional Information: full citation, abstract, references, citings, index terms

> The efficiency of searching scaling-invariant and shifting-invariant shapes in a set of massive time series data can be improved if searching is performed on an approximated sequence which involves less data but contains all the significant features. However, commonly used smoothing techniques, such as moving averages and best-fitting polylines, usually miss important peaks and troughs and deform the time series. In addition, these techniques are not robust, as they often requires users to suppl ...

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1 Exploratory mining and pruning optimizations of constrained associations rules   ◼
◈ Raymond T. Ng, Laks V. S. Lakshmanan, Jiawei Han, Alex Pang
June 1998 **ACM SIGMOD Record , Proceedings of the 1998 ACM SIGMOD international conference on Management of data SIGMOD '98**, Volume 27 Issue 2
Publisher: ACM Press

Full text available: 📄 pdf(1.65 MB)   Additional Information: full citation, abstract, references, citings, index terms

From the standpoint of supporting human-centered discovery of knowledge, the present-day model of mining association rules suffers from the following serious shortcomings: (i) lack of user exploration and control, (ii) lack of focus, and (iii) rigid notion of relationships. In effect, this model functions as a black-box, admitting little user interaction in between. We propose, in this paper, an architecture that opens up the black-box, and supports constraint-based, human-centered explorat ...

2 Multi Relational Data Mining (MRDM): Scalability and efficiency in multi-relational   ◼
◈ data mining
Hendrik Blockeel, Michèle Sebag
July 2003 **ACM SIGKDD Explorations Newsletter**, Volume 5 Issue 1
Publisher: ACM Press
Full text available: 📄 pdf(1.61 MB)   Additional Information: full citation, abstract, references, citings

Efficiency and Scalability have always been important concerns in the field of data mining, and are even more so in the multi-relational context, which is inherently more complex. The issue has been receiving an increasing amount of attention during the last few years, and quite a number of theoretical results, algorithms and implementations have been presented that explicitly aim at improving the efficiency and Scalability of multi-relational data mining approaches. With this article we attempt ...

3 Pattern discovery and forecasting: Mining sequential patterns with constraints in large ▬
◈ databases
Jian Pei, Jiawei Han, Wei Wang
November 2002 **Proceedings of the eleventh international conference on Information and knowledge management**
Publisher: ACM Press

Full text available: 📄 pdf(252.19 KB)   Additional Information: full citation, abstract, references, citings, index terms

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is no systematic study on *constraint-based sequential pattern mining*. In this paper, we investigate this issue and point out that the framework developed for constrained frequent-pattern mining does not fit our missions well. An extended framework is developed based on a *sequential pattern growth* methodology. Our study shows that constraints can be effectively and efficiently pushed deep into ...

4 A template model for multidimensional inter-transactional association rules

Ling Feng, Jeffrey Xu Yu, Hongjun Lu, Jiawei Han
October 2002 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 11 Issue 2
Publisher: Springer-Verlag New York, Inc.
Full text available: pdf(313.62 KB)   Additional Information: full citation, abstract, index terms

Multidimensional inter-transactional association rules extend the traditional association rules to describe more general associations among items with multiple properties across transactions. "*After McDonald and Burger King open branches, KFC will open a branch two months later and one mile away*" is an example of such rules. Since the number of potential inter-transactional association rules tends to be extremely large, mining inter-transactional associations poses more challe ...

Keywords: Intra-transactional/inter-transactional association rules, Multidimensional context, Template model

5 Optimization of constrained frequent set queries with 2-variable constraints

Laks V. S. Lakshmanan, Raymond Ng, Jiawei Han, Alex Pang
June 1999 **ACM SIGMOD Record , Proceedings of the 1999 ACM SIGMOD international conference on Management of data SIGMOD '99**, Volume 28 Issue 2
Publisher: ACM Press
Full text available: pdf(1.65 MB)   Additional Information: full citation, abstract, references, citings, index terms

Currently, there is tremendous interest in providing ad-hoc mining capabilities in database management systems. As a first step towards this goal, in [15] we proposed an architecture for supporting constraint-based, human-centered, exploratory mining of various kinds of rules including associations, introduced the notion of constrained frequent set queries (CFQs), and developed effective pruning optimizations for CFQs with 1-variable (1-var) constraints. While 1-var constraints a ...

6 Scalable data mining with model constraints

Minos Garofalakis, Rajeev Rastogi
December 2000 **ACM SIGKDD Explorations Newsletter**, Volume 2 Issue 2
Publisher: ACM Press
Full text available: pdf(1.15 MB)   Additional Information: full citation, index terms

Keywords: data mining constraints, decision tables, sequential patterns
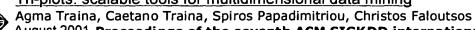
7 Mining the most interesting rules

Roberto J. Bayardo, Rakesh Agrawal
August 1999 **Proceedings of the fifth ACM SIGKDD international conference on Knowledge discovery and data mining**
Publisher: ACM Press
Full text available: pdf(1.29 MB)   Additional Information: full citation, references, citings, index terms

8   Tri-plots: scalable tools for multidimensional data mining

Agma Traina, Caetano Traina, Spiros Papadimitriou, Christos Faloutsos
August 2001 **Proceedings of the seventh ACM SIGKDD international conference on Knowledge discovery and data mining**
Publisher: ACM Press

Full text available: pdf(883.71 KB)   Additional Information: full citation, abstract, references, citings, index terms

We focus on the problem of finding patterns across two large, multidimensional datasets. For example, given feature vectors of healthy and of non-healthy patients, we want to answer the following questions: Are the two clouds of points separable? What is the smallest/largest pair-wise distance across the two datasets? Which of the two clouds does a new point (feature vector) come from?We propose a new tool, the *tri-plot*, and its generalization, the *pq-plot*, which help us answer the ...

9   Research track poster: Integration of profile hidden Markov model output into association rule mining

Christopher Besemann, Anne Denton
August 2005 **Proceeding of the eleventh ACM SIGKDD international conference on Knowledge discovery in data mining KDD '05**
Publisher: ACM Press

Full text available: pdf(794.15 KB)   Additional Information: full citation, abstract, references, index terms

Scientific models typically depend on parameters. Preserving the parameter dependence of models in the pattern mining context opens up several applications. Within association rule mining (ARM), the choice of parameters can be studied with more flexibly then in traditional model building. Studying support, confidence, and other rule metrics as a function of model parameters allows conclusions on assumptions underlying the models. We present efficient techniques to handle multiple model output da ...

Keywords: association rule mining, model mining, profile hidden Markov model

10   Multi Relational Data Mining (MRDM): State of the art of graph-based data mining

Takashi Washio, Hiroshi Motoda
July 2003 **ACM SIGKDD Explorations Newsletter**, Volume 5 Issue 1
Publisher: ACM Press

Full text available: pdf(1.20 MB)   Additional Information: full citation, abstract, references, citings

The need for mining structured data has increased in the past few years. One of the best studied data structures in computer science and discrete mathematics are graphs. It can therefore be no surprise that graph based data mining has become quite popular in the last few years.This article introduces the theoretical basis of graph based data mining and surveys the state of the art of graph-based data mining. Brief descriptions of some representative approaches are provided as well.

Keywords: data mining, graph, graph-based data mining, path, structured data, tree

11   The segment support map: scalable mining of frequent itemsets

Laks V. S. Lakshmanan, Carson Kai-Sang Leung, Raymond T. Ng
December 2000 **ACM SIGKDD Explorations Newsletter**, Volume 2 Issue 2
Publisher: ACM Press

Full text available: pdf(712.50 KB)   Additional Information: full citation, citings, index terms

Keywords: association rule, frequent sets, scalable data mining

12 Research track paper: On mining cross-graph quasi-cliques

Jian Pei, Daxin Jiang, Aidong Zhang

August 2005 **Proceeding of the eleventh ACM SIGKDD international conference on Knowledge discovery in data mining KDD '05**

Publisher: ACM Press

Full text available: pdf(573.85 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>index terms</u>

Joint mining of multiple data sets can often discover interesting, novel, and reliable patterns which cannot be obtained solely from any single source. For example, in cross-market customer segmentation, a group of customers who behave similarly in multiple markets should be considered as a more coherent and more reliable cluster than clusters found in a single market. As another example, in bioinformatics, by joint mining of gene expression data and protein interaction data, we can find cluster ...

Keywords: bioinformatics, graph mining, patterns

13 Research track posters: Generalizing the notion of support

Michael Steinbach, Pang-Ning Tan, Hui Xiong, Vipin Kumar

August 2004 **Proceedings of the tenth ACM SIGKDD international conference on Knowledge discovery and data mining KDD '04**

Publisher: ACM Press

Full text available: pdf(194.35 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>index terms</u>

The goal of this paper is to show that generalizing the notion of support can be useful in extending association analysis to non-traditional types of patterns and non-binary data. To that end, we describe a framework for generalizing support that is based on the simple, but useful observation that support can be viewed as the composition of two functions: a function that evaluates the strength or presence of a pattern in each object (transaction) and a function that summarizes these evaluations ...

Keywords: association analysis, hyperclique, support

14 A perspective on inductive databases

Luc De Raedt

December 2002 **ACM SIGKDD Explorations Newsletter**, Volume 4 Issue 2

Publisher: ACM Press

Full text available: pdf(179.64 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>

Inductive databases tightly integrate databases with data mining. The key ideas are that data and patterns (or models) are handled in the same way and that an inductive query language allows the user to query and manipulate the patterns (or models) of interest.This paper proposes a simple and abstract model for inductive databases. We describe the basic formalism, a simple but fairly powerful inductive query language, some basics of reasoning for query optimization, and discuss some memory organ ...

Keywords: constraint-based mining, inductive databases, inductive querying

15 Scalable algorithms for mining large databases

Rajeev Rastogi, Kyuseok Shim

August 1999 **Tutorial notes of the fifth ACM SIGKDD international conference on Knowledge discovery and data mining**
Publisher: ACM Press
Full text available: pdf(4.11 MB)   Additional Information: full citation, references, citings, index terms

16 Frequent patterns I: Selecting the right interestingness measure for association patterns
Pang-Ning Tan, Vipin Kumar, Jaideep Srivastava
July 2002 **Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining**
Publisher: ACM Press
Full text available: pdf(937.37 KB)   Additional Information: full citation, abstract, references, citings, index terms, review

Many techniques for association rule mining and feature selection require a suitable metric to capture the dependencies among variables in a data set. For example, metrics such as support, confidence, lift, correlation, and collective strength are often used to determine the interestingness of association patterns. However, many such measures provide conflicting information about the interestingness of a pattern, and the best metric to use for a given application domain is rarely known. In this ...

Keywords: associations, contingency tables, interestingness measure

17 Logical foundations of object-oriented and frame-based languages
Michael Kifer, Georg Lausen, James Wu
July 1995 **Journal of the ACM (JACM)**, Volume 42 Issue 4
Publisher: ACM Press
Full text available: pdf(7.52 MB)   Additional Information: full citation, abstract, references, citings, index terms, review

We propose a novel formalism, called Frame Logic (abbr., F-logic), that accounts in a clean and declarative fashion for most of the structural aspects of object-oriented and frame-based languages. These features include object identity, complex objects, inheritance, polymorphic types, query methods, encapsulation, and others. In a sense, F-logic stands in the same relationship to the object-oriented paradigm as classical predicate calculus stands to relational programming. ...

Keywords: deductive databases, frame-based languages, logic programming, nonmonotonic inheritance, object-oriented programming, proof theory, semantics, typing

18 Exploratory mining via constrained frequent set queries
Raymond Ng, Laks V. S. Lakshmanan, Jiawei Han, Teresa Mah
June 1999 **ACM SIGMOD Record , Proceedings of the 1999 ACM SIGMOD international conference on Management of data SIGMOD '99**, Volume 28 Issue 2
Publisher: ACM Press
Full text available: pdf(353.58 KB)   Additional Information: full citation, abstract, references, citings, index terms

Although there have been many studies on data mining, to date there have been few research prototypes or commercial systems supporting comprehensive query-driven mining, which encourages interactive exploration of the data. Our thesis is that constraint constructs and the optimization they induce play a pivotal role in mining queries, thus substantially enhancing the usefulness and performance of the mining system. This is based on the analogy of declarative query languages like SQL and que ...

19 Multi Relational Data Mining (MRDM): Biological applications of multi-relational data mining

David Page, Mark Craven
July 2003 **ACM SIGKDD Explorations Newsletter,** Volume 5 Issue 1
Publisher: ACM Press
Full text available: pdf(1.12 MB)   Additional Information: full citation, abstract, references, citings

> Biological databases contain a wide variety of data types, often with rich relational structure. Consequently multi-relational data mining techniques frequently are applied to biological data. This paper presents several applications of multi-relational data mining to biological data, taking care to cover a broad range of multi-relational data mining techniques.

20 Computing curricula 2001

September 2001 **Journal on Educational Resources in Computing (JERIC)**
Publisher: ACM Press
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1 Exploratory mining and pruning optimizations of constrained associations rules ■

Raymond T. Ng, Laks V. S. Lakshmanan, Jiawei Han, Alex Pang

June 1998 **ACM SIGMOD Record , Proceedings of the 1998 ACM SIGMOD international conference on Management of data SIGMOD '98**, Volume 27 Issue 2
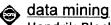
Publisher: ACM Press

Full text available: **⬚** pdf(1.65 MB)

Additional Information: full citation, abstract, references, citings, index terms

From the standpoint of supporting human-centered discovery of knowledge, the present-day model of mining association rules suffers from the following serious shortcomings: (i) lack of user exploration and control, (ii) lack of focus, and (iii) rigid notion of relationships. In effect, this model functions as a black-box, admitting little user interaction in between. We propose, in this paper, an architecture that opens up the black-box, and supports constraint-based, human-centered explorat ...

2 Multi Relational Data Mining (MRDM): Scalability and efficiency in multi-relational ■
data mining

Hendrik Blockeel, Michèle Sebag

July 2003 **ACM SIGKDD Explorations Newsletter**, Volume 5 Issue 1

Publisher: ACM Press

Full text available: **⬚** pdf(1.61 MB)   Additional Information: full citation, abstract, references, citings

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3 Pattern discovery and forecasting: Mining sequential patterns with constraints in large ■
databases

Jian Pei, Jiawei Han, Wei Wang

November 2002 **Proceedings of the eleventh international conference on Information and knowledge management**

Publisher: ACM Press

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4 A template model for multidimensional inter-transactional association rules

Ling Feng, Jeffrey Xu Yu, Hongjun Lu, Jiawei Han

October 2002 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 11 Issue 2

Publisher: Springer-Verlag New York, Inc.

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6 Scalable data mining with model constraints

Minos Garofalakis, Rajeev Rastogi

December 2000 **ACM SIGKDD Explorations Newsletter**, Volume 2 Issue 2

Publisher: ACM Press

Full text available: pdf(1.15 MB)   Additional Information: full citation, index terms

Keywords: data mining constraints, decision tables, sequential patterns

7 Mining the most interesting rules

Roberto J. Bayardo, Rakesh Agrawal

August 1999 **Proceedings of the fifth ACM SIGKDD international conference on Knowledge discovery and data mining**

Publisher: ACM Press

Full text available: pdf(1.29 MB)   Additional Information: full citation, references, citings, index terms

8 Tri-plots: scalable tools for multidimensional data mining

Agma Traina, Caetano Traina, Spiros Papadimitriou, Christos Faloutsos
August 2001 **Proceedings of the seventh ACM SIGKDD international conference on Knowledge discovery and data mining**
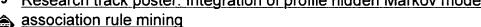Publisher: ACM Press

Full text available: pdf(883.71 KB)   Additional Information: full citation, abstract, references, citings, index terms

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9 Research track poster: Integration of profile hidden Markov model output into association rule mining

Christopher Besemann, Anne Denton
August 2005 **Proceeding of the eleventh ACM SIGKDD international conference on Knowledge discovery in data mining KDD '05**
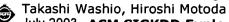Publisher: ACM Press

Full text available: pdf(794.15 KB)   Additional Information: full citation, abstract, references, index terms

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Keywords: association rule mining, model mining, profile hidden Markov model

10 Multi Relational Data Mining (MRDM): State of the art of graph-based data mining

Takashi Washio, Hiroshi Motoda
July 2003 **ACM SIGKDD Explorations Newsletter**, Volume 5 Issue 1
Publisher: ACM Press

Full text available: pdf(1.20 MB)   Additional Information: full citation, abstract, references, citings

The need for mining structured data has increased in the past few years. One of the best studied data structures in computer science and discrete mathematics are graphs. It can therefore be no surprise that graph based data mining has become quite popular in the last few years.This article introduces the theoretical basis of graph based data mining and surveys the state of the art of graph-based data mining. Brief descriptions of some representative approaches are provided as well.

Keywords: data mining, graph, graph-based data mining, path, structured data, tree

11 The segment support map: scalable mining of frequent itemsets

Laks V. S. Lakshmanan, Carson Kai-Sang Leung, Raymond T. Ng
December 2000 **ACM SIGKDD Explorations Newsletter**, Volume 2 Issue 2
Publisher: ACM Press

Full text available: pdf(712.50 KB)   Additional Information: full citation, citings, index terms

Keywords: association rule, frequent sets, scalable data mining

12 Research track paper: On mining cross-graph quasi-cliques

Jian Pei, Daxin Jiang, Aidong Zhang

August 2005 **Proceeding of the eleventh ACM SIGKDD international conference on Knowledge discovery in data mining KDD '05**

Publisher: ACM Press

Full text available: pdf(573.85 KB)　　Additional Information: full citation, abstract, references, index terms

Joint mining of multiple data sets can often discover interesting, novel, and reliable patterns which cannot be obtained solely from any single source. For example, in cross-market customer segmentation, a group of customers who behave similarly in multiple markets should be considered as a more coherent and more reliable cluster than clusters found in a single market. As another example, in bioinformatics, by joint mining of gene expression data and protein interaction data, we can find cluster ...

Keywords: bioinformatics, graph mining, patterns

13 Research track posters: Generalizing the notion of support

Michael Steinbach, Pang-Ning Tan, Hui Xiong, Vipin Kumar

August 2004 **Proceedings of the tenth ACM SIGKDD international conference on Knowledge discovery and data mining KDD '04**

Publisher: ACM Press

Full text available: pdf(194.35 KB)　　Additional Information: full citation, abstract, references, index terms

The goal of this paper is to show that generalizing the notion of support can be useful in extending association analysis to non-traditional types of patterns and non-binary data. To that end, we describe a framework for generalizing support that is based on the simple, but useful observation that support can be viewed as the composition of two functions: a function that evaluates the strength or presence of a pattern in each object (transaction) and a function that summarizes these evaluations ...

Keywords: association analysis, hyperclique, support

14 A perspective on inductive databases

Luc De Raedt

December 2002 **ACM SIGKDD Explorations Newsletter**, Volume 4 Issue 2

Publisher: ACM Press

Full text available: pdf(179.64 KB)　　Additional Information: full citation, abstract, references, citings

Inductive databases tightly integrate databases with data mining. The key ideas are that data and patterns (or models) are handled in the same way and that an inductive query language allows the user to query and manipulate the patterns (or models) of interest.This paper proposes a simple and abstract model for inductive databases. We describe the basic formalism, a simple but fairly powerful inductive query language, some basics of reasoning for query optimization, and discuss some memory organ ...

Keywords: constraint-based mining, inductive databases, inductive querying

15 Scalable algorithms for mining large databases

Rajeev Rastogi, Kyuseok Shim

August 1999 **Tutorial notes of the fifth ACM SIGKDD international conference on Knowledge discovery and data mining**
Publisher: ACM Press
Full text available: pdf(4.11 MB)   Additional Information: full citation, references, citings, index terms

16 Frequent patterns I: Selecting the right interestingness measure for association patterns

Pang-Ning Tan, Vipin Kumar, Jaideep Srivastava
July 2002 **Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining**
Publisher: ACM Press

Full text available: pdf(937.37 KB)   Additional Information: full citation, abstract, references, citings, index terms, review

Many techniques for association rule mining and feature selection require a suitable metric to capture the dependencies among variables in a data set. For example, metrics such as support, confidence, lift, correlation, and collective strength are often used to determine the interestingness of association patterns. However, many such measures provide conflicting information about the interestingness of a pattern, and the best metric to use for a given application domain is rarely known. In this ...

Keywords: associations, contingency tables, interestingness measure

17 Logical foundations of object-oriented and frame-based languages

Michael Kifer, Georg Lausen, James Wu
July 1995 **Journal of the ACM (JACM)**, Volume 42 Issue 4
Publisher: ACM Press

Full text available: pdf(7.52 MB)   Additional Information: full citation, abstract, references, citings, index terms, review

We propose a novel formalism, called Frame Logic (abbr., F-logic), that accounts in a clean and declarative fashion for most of the structural aspects of object-oriented and frame-based languages. These features include object identity, complex objects, inheritance, polymorphic types, query methods, encapsulation, and others. In a sense, F-logic stands in the same relationship to the object-oriented paradigm as classical predicate calculus stands to relational programming. ...

Keywords: deductive databases, frame-based languages, logic programming, nonmonotonic inheritance, object-oriented programming, proof theory, semantics, typing

18 Exploratory mining via constrained frequent set queries

Raymond Ng, Laks V. S. Lakshmanan, Jiawei Han, Teresa Mah
June 1999 **ACM SIGMOD Record , Proceedings of the 1999 ACM SIGMOD international conference on Management of data SIGMOD '99**, Volume 28 Issue 2
Publisher: ACM Press

Full text available: pdf(353.58 KB)   Additional Information: full citation, abstract, references, citings, index terms

Although there have been many studies on data mining, to date there have been few research prototypes or commercial systems supporting comprehensive query-driven mining, which encourages interactive exploration of the data. Our thesis is that constraint constructs and the optimization they induce play a pivotal role in mining queries, thus substantially enhancing the usefulness and performance of the mining system. This is based on the analogy of declarative query languages like SQL and que ...

19 Multi Relational Data Mining (MRDM): Biological applications of multi-relational data mining

David Page, Mark Craven
July 2003 **ACM SIGKDD Explorations Newsletter,** Volume 5 Issue 1
Publisher: ACM Press
Full text available: pdf(1.12 MB)   Additional Information: full citation, abstract, references, citings

> Biological databases contain a wide variety of data types, often with rich relational structure. Consequently multi-relational data mining techniques frequently are applied to biological data. This paper presents several applications of multi-relational data mining to biological data, taking care to cover a broad range of multi-relational data mining techniques.

20 Computing curricula 2001

September 2001 **Journal on Educational Resources in Computing (JERIC)**
Publisher: ACM Press
Full text available: pdf(613.63 KB)
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1 Exploratory mining and pruning optimizations of constrained associations rules   ▰
Raymond T. Ng, Laks V. S. Lakshmanan, Jiawei Han, Alex Pang
June 1998 **ACM SIGMOD Record , Proceedings of the 1998 ACM SIGMOD international
            conference on Management of data SIGMOD '98**, Volume 27 Issue 2
Publisher: ACM Press

Full text available: 🗎 pdf(1.65 MB)   Additional Information: full citation, abstract, references, citings, index
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From the standpoint of supporting human-centered discovery of knowledge, the present-
day model of mining association rules suffers from the following serious shortcomings: (i)
lack of user exploration and control, (ii) lack of focus, and (iii) rigid notion of
relationships. In effect, this model functions as a black-box, admitting little user
interaction in between. We propose, in this paper, an architecture that opens up the
black-box, and supports constraint-based, human-centered explorat ...

2 Pattern discovery and forecasting: Mining sequential patterns with constraints in large ▰
databases
Jian Pei, Jiawei Han, Wei Wang
November 2002 **Proceedings of the eleventh international conference on Information
                and knowledge management**
Publisher: ACM Press

Full text available: 🗎 pdf(252.19 KB)   Additional Information: full citation, abstract, references, citings, index
                                                                 terms

Constraints are essential for many sequential pattern mining applications. However, there
is no systematic study on *constraint-based sequential pattern mining*. In this paper, we
investigate this issue and point out that the framework developed for constrained
frequent-pattern mining does not fit our missions well. An extended framework is
developed based on a *sequential pattern growth* methodology. Our study shows that
constraints can be effectively and efficiently pushed deep into ...

3 Optimization of constrained frequent set queries with 2-variable constraints   ▰
Laks V. S. Lakshmanan, Raymond Ng, Jiawei Han, Alex Pang
June 1999 **ACM SIGMOD Record , Proceedings of the 1999 ACM SIGMOD international
            conference on Management of data SIGMOD '99**, Volume 28 Issue 2
Publisher: ACM Press

Full text available: 🗎 pdf(1.65 MB)   Additional Information: full citation, abstract, references, citings, index
                                                                 terms

Currently, there is tremendous interest in providing ad-hoc mining capabilities in database management systems. As a first step towards this goal, in [15] we proposed an architecture for supporting constraint-based, human-centered, exploratory mining of various kinds of rules including associations, introduced the notion of constrained frequent set queries (CFQs), and developed effective pruning optimizations for CFQs with 1-variable (1-var) constraints. While 1-var constraints a ...

4 Routing: Metarouting

Timothy G. Griffin, João Luís Sobrinho

August 2005 **Proceedings of the 2005 conference on Applications, technologies, architectures, and protocols for computer communica tions SIGCOMM '05**

Publisher: ACM Press

Full text available: pdf(258.67 KB)   Additional Information: full citation, abstract, references, index terms

There is a shortage of routing protocols that meet the needs of network engineers. This has led to BGP being pressed into service as an IGP, despite its lack of convergence guarantees. The development, standardization, and deployment of routing protocols, or even minor changes to existing protocols, are very difficult tasks. We present an approach called Metarouting that defines routing protocols using a high-level and declarative language. Once an interpreter for a metarouting language is imple ...

Keywords: algebraic routing, path algebras, routing protocols

5 Logical foundations of object-oriented and frame-based languages

Michael Kifer, Georg Lausen, James Wu

July 1995 **Journal of the ACM (JACM)**, Volume 42 Issue 4

Publisher: ACM Press

Full text available: pdf(7.52 MB)   Additional Information: full citation, abstract, references, citings, index terms, review

We propose a novel formalism, called Frame Logic (abbr., F-logic), that accounts in a clean and declarative fashion for most of the structural aspects of object-oriented and frame-based languages. These features include object identity, complex objects, inheritance, polymorphic types, query methods, encapsulation, and others. In a sense, F-logic stands in the same relationship to the object-oriented paradigm as classical predicate calculus stands to relational programming. ...

Keywords: deductive databases, frame-based languages, logic programming, nonmonotonic inheritance, object-oriented programming, proof theory, semantics, typing

6 Scalable data mining with model constraints

Minos Garofalakis, Rajeev Rastogi

December 2000 **ACM SIGKDD Explorations Newsletter**, Volume 2 Issue 2

Publisher: ACM Press

Full text available: pdf(1.15 MB)   Additional Information: full citation, index terms

Keywords: data mining constraints, decision tables, sequential patterns

7 Mining the most interesting rules

Roberto J. Bayardo, Rakesh Agrawal

August 1999 **Proceedings of the fifth ACM SIGKDD international conference on**

Knowledge discovery and data mining
Publisher: ACM Press
Full text available: 📄 pdf(1.29 MB)   Additional Information: <u>full citation</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

8 <u>A perspective on inductive databases</u>   ■

Luc De Raedt
December 2002 **ACM SIGKDD Explorations Newsletter,** Volume 4 Issue 2
Publisher: ACM Press
Full text available: 📄 <u>pdf(179.64 KB)</u>   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>

Inductive databases tightly integrate databases with data mining. The key ideas are that data and patterns (or models) are handled in the same way and that an inductive query language allows the user to query and manipulate the patterns (or models) of interest.This paper proposes a simple and abstract model for inductive databases. We describe the basic formalism, a simple but fairly powerful inductive query language, some basics of reasoning for query optimization, and discuss some memory organ ...

Keywords: constraint-based mining, inductive databases, inductive querying

9 <u>Frequent patterns I: Selecting the right interestingness measure for association</u>   ■
    <u>patterns</u>

Pang-Ning Tan, Vipin Kumar, Jaideep Srivastava
July 2002 **Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining**
Publisher: ACM Press
Full text available: 📄 <u>pdf(937.37 KB)</u>   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>, <u>review</u>

Many techniques for association rule mining and feature selection require a suitable metric to capture the dependencies among variables in a data set. For example, metrics such as support, confidence, lift, correlation, and collective strength are often used to determine the interestingness of association patterns. However, many such measures provide conflicting information about the interestingness of a pattern, and the best metric to use for a given application domain is rarely known. In this ...

Keywords: associations, contingency tables, interestingness measure

10 <u>Tri-plots: scalable tools for multidimensional data mining</u>   ■

Agma Traina, Caetano Traina, Spiros Papadimitriou, Christos Faloutsos
August 2001 **Proceedings of the seventh ACM SIGKDD international conference on Knowledge discovery and data mining**
Publisher: ACM Press
Full text available: 📄 <u>pdf(883.71 KB)</u>   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

We focus on the problem of finding patterns across two large, multidimensional datasets. For example, given feature vectors of healthy and of non-healthy patients, we want to answer the following questions: Are the two clouds of points separable? What is the smallest/largest pair-wise distance across the two datasets? Which of the two clouds does a new point (feature vector) come from?We propose a new tool, the *tri-plot*, and its generalization, the *pq-plot*, which help us answer the ...

11   ■
    <u>Subtyping recursive types</u>

Roberto M. Amadio, Luca Cardelli
September 1993 **ACM Transactions on Programming Languages and Systems (TOPLAS)**, Volume 15 Issue 4
Publisher: ACM Press

Full text available: pdf(3.29 MB)   Additional Information: full citation, abstract, references, citings, index terms

We investigate the interactions of subtyping and recursive types, in a simply typed &lgr;-calculus. The two fundamental questions here are whether two (recursive)types are in the subtype relation and whether a term has a type. To address the first question, we relate various definitions of type equivalence and subtyping that are induced by a model, an ordering on infinite trees, an algorithm, and a set of type rules. We show soundness and completeness among the rules, the algorithm, and the ...

Keywords: coercions, lambda-calculus, partial-equivalence relations, recursive types, regular trees, subtyping, tree orderings, type equivalence, typechecking algorithm

12 Searching for dependencies at multiple abstraction levels ▪
Toon Calders, Raymond T. Ng, Jef Wijsen
September 2002 **ACM Transactions on Database Systems (TODS)**, Volume 27 Issue 3
Publisher: ACM Press

Full text available: pdf(411.24 KB)   Additional Information: full citation, abstract, references, citings, index terms

The notion of roll-up dependency (RUD) extends functional dependencies with generalization hierarchies. RUDs can be applied in OLAP and database design. The problem of discovering RUDs in large databases is at the center of this paper. An algorithm is provided that relies on a number of theoretical results. The algorithm has been implemented; results on two real-life datasets are given. The extension of functional dependency (FD) with roll-ups turns out to capture meaningful rules that are outsi ...

Keywords: Data mining, functional dependencies, knowledge discovery, online analytical processing

13 Ordered chaining calculi for first-order theories of transitive relations ▪
Leo Bachmair, Harald Ganzinger
November 1998 **Journal of the ACM (JACM)**, Volume 45 Issue 6
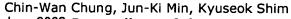**Publisher:** ACM Press

Full text available: pdf(279.40 KB)   Additional Information: full citation, abstract, references, citings, index terms

We propose inference systems for binary relations that satisfy composition laws such as transitivity. Our inference mechanisms are based on standard techniques from term rewriting and represent a refinement of chaining methods as they are used in the context of resolution-type theorem proving. We establish the refutational completeness of these calculi and prove that our methods are compatible with the usual simplification techniques employed in refutational theorem provers, such as subsump ...

Keywords: chaining calculi, equational logic, reduction orderings, rewrite systems, term rewriting, transitive relations

14 Research sessions: path indexing: APEX: an adaptive path index for XML data ▪
Chin-Wan Chung, Jun-Ki Min, Kyuseok Shim
June 2002 **Proceedings of the 2002 ACM SIGMOD international conference on**

Management of data SIGMOD '02
Publisher: ACM Press

Full text available: 🗋 pdf(1.16 MB)   Additional Information: full citation, abstract, references, citings, index terms

The emergence of the Web has increased interests in XML data. XML query languages such as XQuery and XPath use label paths to traverse the irregularly structured data. Without a structural summary and efficient indexes, query processing can be quite inefficient due to an exhaustive traversal on XML data. To overcome the inefficiency, several path indexes have been proposed in the research community. Traditional indexes generally record all label paths from the root element in XML data. Such path ...

15 Research track posters: Generalizing the notion of support   ■

Michael Steinbach, Pang-Ning Tan, Hui Xiong, Vipin Kumar
August 2004 **Proceedings of the tenth ACM SIGKDD international conference on Knowledge discovery and data mining KDD '04**
Publisher: ACM Press

Full text available: 🗋 pdf(194.35 KB)   Additional Information: full citation, abstract, references, index terms

The goal of this paper is to show that generalizing the notion of support can be useful in extending association analysis to non-traditional types of patterns and non-binary data. To that end, we describe a framework for generalizing support that is based on the simple, but useful observation that support can be viewed as the composition of two functions: a function that evaluates the strength or presence of a pattern in each object (transaction) and a function that summarizes these evaluations ...

Keywords: association analysis, hyperclique, support

16 Exploratory mining via constrained frequent set queries   ■

Raymond Ng, Laks V. S. Lakshmanan, Jiawei Han, Teresa Mah
June 1999 **ACM SIGMOD Record , Proceedings of the 1999 ACM SIGMOD international conference on Management of data SIGMOD '99**, Volume 28 Issue 2
Publisher: ACM Press

Full text available: 🗋 pdf(353.58 KB)   Additional Information: full citation, abstract, references, citings, index terms

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17 Research track poster: Integration of profile hidden Markov model output into   ■
association rule mining

Christopher Besemann, Anne Denton
August 2005 **Proceeding of the eleventh ACM SIGKDD international conference on Knowledge discovery in data mining KDD '05**
Publisher: ACM Press

Full text available: 🗋 pdf(794.15 KB)   Additional Information: full citation, abstract, references, index terms

Scientific models typically depend on parameters. Preserving the parameter dependence of models in the pattern mining context opens up several applications. Within association rule mining (ARM), the choice of parameters can be studied with more flexibly then in traditional model building. Studying support, confidence, and other rule metrics as a function of model parameters allows conclusions on assumptions underlying the models. We present efficient techniques to handle multiple model output da ...

Keywords: association rule mining, model mining, profile hidden Markov model

18 Proving the correctness of reactive systems using sized types

John Hughes, Lars Pareto, Amr Sabry

January 1996 **Proceedings of the 23rd ACM SIGPLAN-SIGACT symposium on Principles of programming languages POPL '96**

Publisher: ACM Press

Full text available: pdf(1.47 MB)   Additional Information: full citation, references, citings, index terms

19 Multi Relational Data Mining (MRDM): Scalability and efficiency in multi-relational data mining

Hendrik Blockeel, Michèle Sebag

July 2003 **ACM SIGKDD Explorations Newsletter**, Volume 5 Issue 1

Publisher: ACM Press

Full text available: pdf(1.61 MB)   Additional Information: full citation, abstract, references, citings

Efficiency and Scalability have always been important concerns in the field of data mining, and are even more so in the multi-relational context, which is inherently more complex. The issue has been receiving an increasing amount of attention during the last few years, and quite a number of theoretical results, algorithms and implementations have been presented that explicitly aim at improving the efficiency and Scalability of multi-relational data mining approaches. With this article we attempt ...

20 Scalable algorithms for mining large databases

Rajeev Rastogi, Kyuseok Shim

August 1999 **Tutorial notes of the fifth ACM SIGKDD international conference on Knowledge discovery and data mining**

Publisher: ACM Press

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